# The Progression of Vulnerability:
## A multi-scalar perspective on disasters, the case of Chaitén, Chile

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## Declaration of authorship

I, **Vicente Andrés Sandoval Henríquez** confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature:

## Abstract

This research analyses policy responses to disasters in Chile. The main objective is to explore linkages between temporally and spatially distant processes of policy, governance and decision-making, and the materialisation of disaster vulnerability in the form of 'unsafe conditions'. The study focuses on the progression of vulnerability in a post-disaster context, critically reflecting on the multiplicity of agencies and pressures in creating and increasing vulnerability of a specific territory at local scale. The central argument is that the Chilean model of disaster risk management and reduction is dominated by top-down and reactive approaches that tend to diminish the potentials of policy responses to disasters and ultimately became sources of vulnerability and risk.

The research's analytical framework is grounded in disaster studies and specifically it adopts a social constructionist approach to disaster, vulnerability and geographical scale focused on the Pressure and Release model. The latter allows one to look at the state territorial organisation of Chile as a structural factor in the national model of disaster management, and to place root causes and dynamic pressures of disaster vulnerability within the multi-scalar configuration of the country. The thesis chooses the Chaitén volcanic eruption that occurred in May 2008 in Los Lagos Region of Chile, and the disaster policy context in the country as the empirical base on which the argument is put forward.

Several policy responses are examined using qualitative methods at national, regional and local scales, revealing the centralisation of disaster governance in Chile as a key factor in producing inadequate responses to the disaster that failed to utilise people's knowledge and local organisational capacities. This disaster policy context mediated the materialisation of four unsafe conditions in Chaitén: the uneven distribution of risks; the limited access to services; the erosion of trust in public authorities; and the weaknesses of emergency planning.

The research re-problematises and suggests new ways of 'thinking vulnerability' and disaster governance from a wider multi-scalar perspective. It explains that when policy responses to disasters do not consider local capacities and realities, these can facilitate the (re)production of unsafe conditions, and contribute to and perpetuate the generation of risks over time. This could help to challenge some still dominant views found in Chile and in many other national governments that dissimulate the causality of disaster generation and risk accumulation.

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*Con amor para mi familia.*

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## List of acronyms and abbreviations

**CASEN** National Socio-Economic Survey
**CH-7** Austral Highway
**CIGIDEN** National Research Centre for Integrated Natural Disaster Management
**CIVDES** Research Centre for Vulnerability and Socio-natural Disasters
**COE** Emergency Operation Centre
**CPC** Civil Protection Committee
**CREDEN** National Commission for Resilience to Disasters of Natural Origin
**DDU** Urban Development Division of the MINVU
**DFL** Decree with Force of Law
**DKKV** German Committee for Disaster Reduction
**DL** Decree-law
**DRM** Disaster Risk Management
**DRR** Disaster Risk Reduction
**DS** Supreme Decree
**EM-DAT** Emergency Events Database
**FCM** Municipal Common Fund
**FNDR** National Fund for Regional Development
**FNR** National Reconstruction Fund
**GAR** Global Assessment Report on Disaster Risk Reduction
**GORE** Regional Government of Los Lagos Region
**HFA** Hyogo Framework for Action 2005-2015
**IFRC** International Federation of Red Cross and Red Crescent Societies
**INDAP** National Institute for Agricultural and Livestock Development
**IPCC** Intergovernmental Panel on Climate Change
**IPT** Territorial Planning Instrument
**IRDR** Integrated Research on Disaster Risk
**LA RED** Network of Social Studies in the Prevention of Disasters in Latin America
**MEP** Municipal Emergency Plan
**MIDEPLAN** Ministry of Planning
**MINSAL** Ministry of Health
**MINVU** Ministry of Housing and Urbanism
**MOP** Ministry of Public Works
**NCh433** Chilean Standard for Seismic Design of Buildings N°429

**ODEPLAN** National Planning Office

**ONEMI** National Emergency Office of the Ministry of Interior and Public Security

**OVDAS** Southern Andean Volcano Observatory

**PAR** The disaster Pressure and Release model

**PNPC** National Plan of Civil Protection

**PROT** Regional Plan for Territorial Planning

**PUC** Pontificia Universidad Católica de Chile

**RADIX** Radical Interpretations of Disasters and Radical Solution

**SDGs** Sustainable Development Goals

**SEREMI** Regional Ministerial Secretaries

**SERNAGEOMIN** National Geology and Mining Service

**SFDRR** Sendai Framework for Disaster Risk Reduction 2015-2030

**SHOA** Chilean Navy Hydrographic and Oceanographic Service

**SII** National Tax Service

**SINIM** National System of Municipal Information

**SMR** Santiago Metropolitan Region

**SNPC** National System of Civil Protection

**SUBDERE** Subsecretariat for Regional Development and Administration

**UACh** Universidad Austral de Chile

**UN-IDNDR** United Nations International Decade for Natural Disaster Reduction

**UNDESA** United Nations Department of Economic and Social Affairs

**UNDP** United Nations Development Programme

**UNDRO** United Nations Disaster Relief Organization

**UNESCO** United Nations Educational, Scientific and Cultural Organization

**UNISDR** United Nations Office for Disaster Risk Reduction

**US$** United State Dollar

**USGS** U.S. Geological Survey

# Chapter ONE
## Introduction

This doctoral journey began in 2008 when I moved to Berlin from Temuco, Chile, with the intention of preparing myself to research social issues. I studied management, planning and development linked to urban development in the Global South, and I learnt various theories, methodologies and techniques that helped me to develop my interest in disasters. But it was not until the 8.8-magnitude Maule earthquake struck Chile in 2010 and the comparable 7.0-magnitude Haiti earthquake in the same year that I became interested in disasters, and especially in the underlying causes that contributed to the enormous difference in the impact of these two events.

When I started the research back in 2011 my main aim was to understand how macro forces and widespread processes such as globalisation and political economic policies could exacerbate vulnerability to disaster at local levels. Chile's socio-economic and political history is linked to the current centralisation of power and resources (Atienza and Aroca, 2012), privatisation of public services, and deregulation of various sectors (Solimano, 2012). This has increased inequality which, in turn, has precipitated an uneven distribution of vulnerability across regions and population groups, with isolated and marginalised communities being particularly vulnerable (Pulgar Pinaud, 2014a).

The translation of vulnerabilities and risks from global and national level to local levels has long been a topic of social scientific research, but as yet there is no consensus amongst central and local governments about how to reduce disasters and risks and the development of such consensus is hindered by other more urgent –although complementary– work on resilience, sustainable development and adaptation to climate change (Maskrey, 2016). Vulnerability to disaster and the risk of disaster are highly complex issues that encompass environmental, cultural, social, economic and political factors. There is no single, uncontested cause of disasters, or

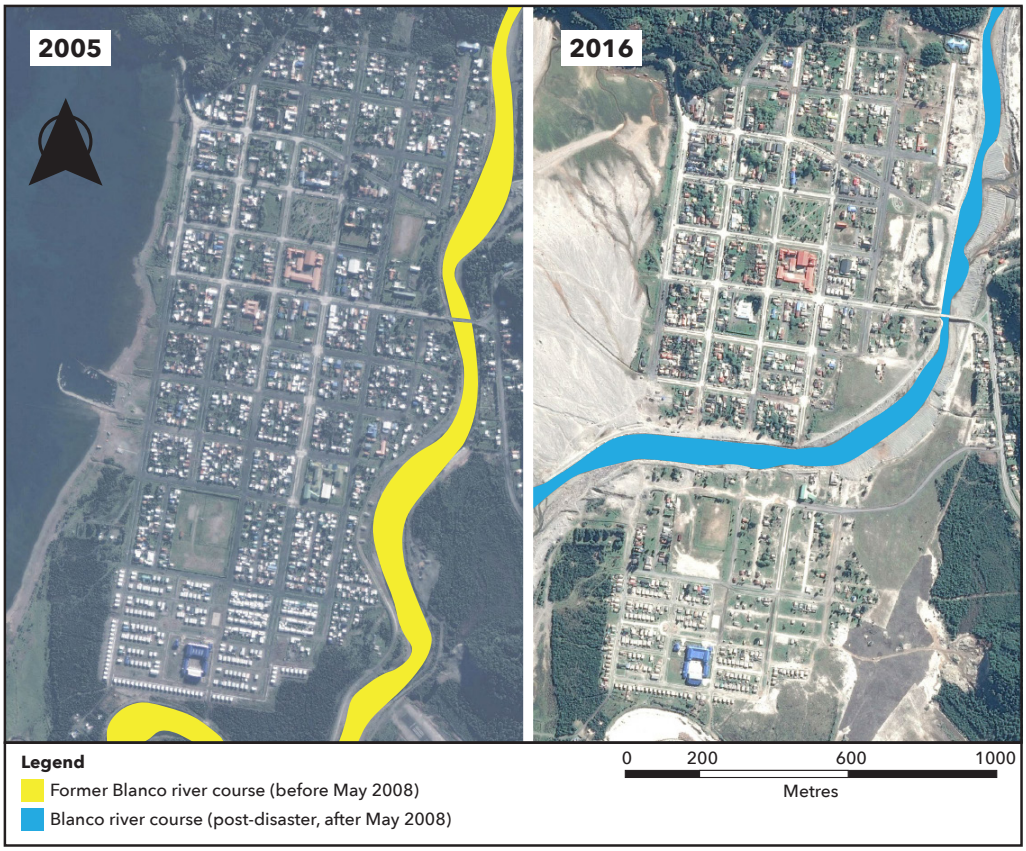
the factors governing vulnerability, risk and their mitigation. This may have contributed to the confounding of vulnerability and risk (Cardona, 2006). This thesis takes a practical approach, examining some aspects of policy responses to disasters and decision-making that are particularly relevant to vulnerability and risk, and looks at how communities at risks, governments, policies, and institutions relate at multiple scales in response to disaster. This thesis recognises, however, that the environment and extreme events contribute to the aetiology of disaster, the impact of disasters, vulnerability to disasters and the risk of disasters.

This was the case in the aftermath of the Chaitén disaster in southern Chile. Chaitén is a remote port city that was affected by a volcanic eruption in 2008 and its path to recovery has been difficult. Generally termed a 'local disaster' by the media and politicians, the Chaitén eruption provides an opportunity for a case study of how apparently 'local' vulnerability is in fact embedded in the wider geographical and temporal context and involves a complex web of national, regional, and local social relations, including governance, power and gender relations, and economic and political processes. Thus, the study of widespread processes nested on global and national levels, and of vulnerable conditions at urban and local levels, involves the shift from a single scale of analysis –Chaitén city– to focusing on the 'process' of vulnerability creation. It is at this point that adopting a 'perspective of scale' begins to seem both interesting and necessary to the simultaneous analysis of the phenomena of disaster vulnerability and risk from different geographical and temporal perspectives. In this thesis I adopt a perspective of scale to capture the social relations linked to disaster risk management (DRM) and disaster risk reduction (DRR) in Chile as they are configured at different spatial levels. I focus on the vertical and horizontal links between local and extra-local levels. Specifically, I investigated the processes of centralisation and decentralisation of the Chilean state from historical and territorial administrative perspectives, to try to explain why the current Chilean model of DRM and DRR is highly centralised, top-down and reactive, and how policy responses to disaster –embedded within this model– may have facilitated the reproduction of vulnerability during the aftermath of the Chaitén

disaster. By model of DRM and DRR I refer to a particular mode of dealing with the reduction and management of risks and disasters.

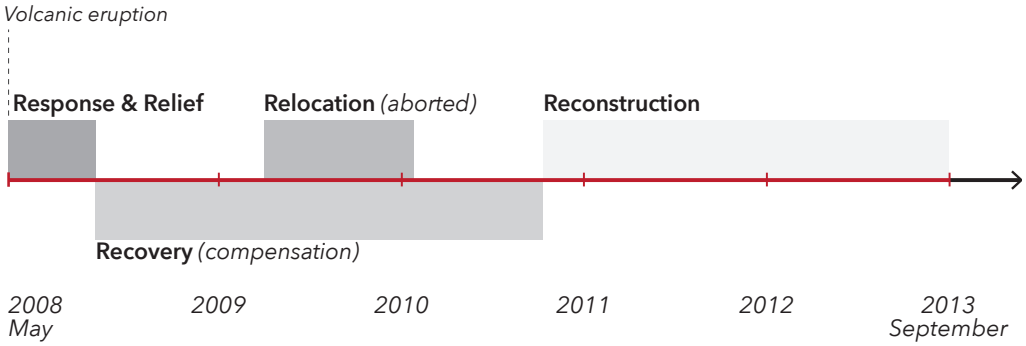
Chaitén is in Los Lagos region, about 1,000 kilometres south of Santiago, the capital of Chile. The community has experienced several difficulties –related to policy responses to disasters and the model of managing risk reduction– in its efforts to recover from the volcanic eruption, when about 8,000 men and women were living in the community. Figure 1.1 briefly illustrates the 'before and after' of the volcanic mudflows that divided the city in May 2008, whilst Figure 1.2 shows the period of the four policy responses analysed during the research.

**Figure 1.1. Chaitén before and after the volcanic eruption**




*Sources: elaborated by the author (2017); satellite image from IGM (2012) and Google Earth Pro (2016)*

**Figure 1.2. Analysed period of policy responses in the Chaitén disaster, 2008-2013**




The Chaitén disaster attracted considerable attention from national media and politicians, resulting in a series of recovery strategies that encompassed economic and social benefits, compensation, relocation, and finally reconstruction. Despite the huge recovery effort, which was not exempt from conflicts between actors at national, regional, and local levels, the city of Chaitén remains vulnerable to volcanic hazard. The process of evacuation and recovery overseen by the central government between 2008 and the end of 2010 had several unforeseen effects that mean it is now assumed that the lives of the people of Chaitén are now more at risk than they were before 2008. Some of the locally specific 'unsafe conditions' observed during the study relate to the uneven distribution of risks, limited access to services, erosion of trust in authorities and weaknesses in emergency planning. However, it is not just the central government's disaster response strategy that is in question, factors relating to community participation and political mobilisation, governance and political-administrative centralisation of power and decision-making –especially those related to DRM and DRR– are just as crucial to understanding how and why the people of Chaitén are still at risk.

For instance, the 'erosion of trust in authorities' detected among *Chaiteninos* –as Chaitén people call themselves– can be linked to the central government's centralising approach to the emergency response, recovery and reconstruction from 2008 onwards. This centralising approach is not, however, an isolated phenomenon; it is part of the Chilean political regime's general tendency towards centralisation

which has prevailed since the 1970s. In describing 'erosion of trust in authorities' as a vulnerability factor in Chaitén I mean that lack of 'trust' can exacerbate vulnerability by altering evacuation strategies and by diminishing the impact of compensation and recovery policies (Cutter et al., 2003). Testimony from several interviews conducted during research for this thesis indicate an important local consensus: in the event of another volcanic eruption *Chaiteninos* will not follow the authorities' instructions as they did in 2008 and so they may react negatively to any new plans for 'evacuation' of the city. The reasons for this relate to regional and national processes: 'misinterpretations' by the central government and authorities concerning the existence of a volcano in the area and the 'tremors' before volcano eruption; an unplanned evacuation that split up families; poor supervision of spending on subsidies and concerns about the misuse of public funds; the decision to lift the ban on inhabiting the North sector but not considering the South; the abandonment of the New Chaitén project after two years of planning, 'spending' and consultation; the creation of a 'parallel' authority –i.e. Presidential Delegate– which bypassed local and regional governments. This thesis looks at all these factors, from specific local vulnerabilities to national factors.

## 1.1 Objectives, justification, and questions

The objective of the thesis is to utilise the case of post-disaster Chaitén to re-problematise the progression of disaster vulnerability and risk from a scalar perspective, by examining how the social construction of disasters and policy responses to them are articulated at inter-connected and hierarchically related scales. In this instance 're-problematising' means looking again at the causes of disasters from a social constructionist perspective, paying particular attention to disaster vulnerability and the socio-economic and political processes that precipitate it. Vulnerability tends to manifest as 'unsafe conditions' in specific social groups and spaces (Wisner et al., 2004) but a multiplicity of actors, rules, and processes related to DRM at different geographical and social scales are also extremely important to its course and reveal the grave significance of the root causes of disaster risk and vulnerability (Tierney, 2012). Decision-making processes,

policy responses, political economic regimes, and powerful institutions involved in DRM and DRR are not always clearly or directly responsible for the 'unsafe conditions'; instead they may be the roots and drivers underlying the development of 'unsafe conditions' and hence the ultimate cause of disasters. This particular extended view of disasters embeds them in a political economic context and recognises that 'social relations', 'structures of domination', 'class confrontations', and other forms of social struggle are the origins of disaster vulnerability and risk (Gunewardena and Schuller, 2008; Wisner et al., 2004).

This view is also called the "vulnerability approach" (Wisner at al., 2004, p.10), which rejects the assumption that disasters are 'causes' in any simple way by external natural events. This thesis adopts this perspective because it enables one to examine the structural factors contributing to disaster risk. Extending our ambitions beyond simply seeking to reduce disaster risk and seeking to tackle the factors that create disaster risk depends on detailed investigation of contemporary and historical causes of vulnerability. Such work would support the integration of disaster risk reduction in the many wider contexts that foment and perpetuate vulnerability (Lewis and Kelman, 2012). Although I agree that other approaches to research on resilience and hazards are necessary, in my view, the problematic of disasters —i.e. the relevant theoretical concepts and practical realities, the debate about causality, and its factual reduction— cannot be thoroughly overcome by means of such studies alone. If we are fully to understand and tackle the causes of disasters, we cannot afford to neglect investigations into the principles that 'govern' their social nature, as social interventions are a far more promising way of reducing the incidence and impact of disasters than interventions in the natural world (Hewitt, 1983; Quarantelli, 1998; Wisner et al., 2004). The value of addressing problematic disaster issues through the lens of vulnerability is based on the idea that putting in places measures to reduce disaster risk and increase resilience depends on societal foundations such as equal access to power and institutions, effective reduction of poverty and inequality, amongst others. Using a vulnerability framework, it is possible to identify such foundations and eventually tackle the root causes of risk to people. In other

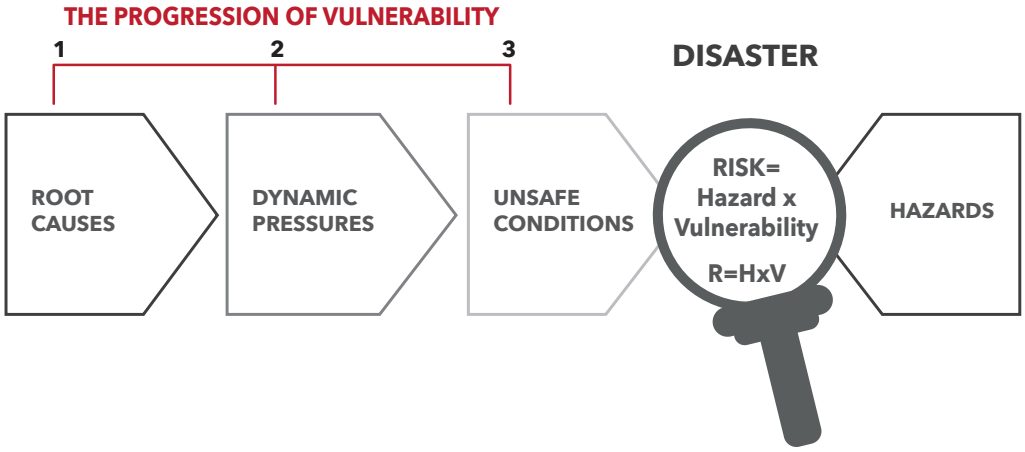
words, this thesis is based on the idea that the more effort we devote to uncovering and understanding the root causes of disasters, the more powerful reasons there will be to mobilise men and women and governments for efforts to reduce disaster risk. As Wisner et al. (2004, p.61) noted, "[disaster] problems will recur again and again in different and increasingly costly forms unless underlying causes are tackled". Although the theoretical and disciplinary debate that this thesis addresses is deployed in Chapter Three, a clarification of key concepts is in order.

Disaster research is polarised into two strands. One emphasises the 'trigger role' (Wisner et al., 2004) of extreme natural events such as earthquakes and hurricanes and encompasses post-disaster research on human responses, trauma, crisis and humanitarian intervention, and the economic, legal, and political consequences of disasters (see examples in Alexander, 1993; Dynes, 1970; Smith, 1996). The second has emerged over the last forty years from social sciences research. Although this perspective does not deny the relevance of natural hazards as triggers events, it emphasises the multiple ways in which social systems produce disasters by making people vulnerable (see examples in Hewitt, 1983; Pelling, 2003a; Wisner et al., 2004). This thesis takes the second perspective as its starting point.

This social perspective puts 'vulnerability' at the centre of the debate. I use the term 'disaster vulnerability' or 'vulnerability to disaster' to refer to the circumstances and characteristics of an element of interest –i.e. community, system, or asset– that influence its capacity to anticipate, cope with, resist and recover from the negative impact of a natural or anthropogenic extreme event (Wisner et al., 2004). To understand and value vulnerability correctly it is necessary, however, to connect it at the theoretical and epistemological levels with the concepts of disaster and risk. In essence, disasters and disaster risk are produced by the combination of a hazardous event, either natural or anthropogenic, and a vulnerable asset, people, or community. At a conceptual level, the equation 'hazard × vulnerability [ × exposure ] = risk → disaster' (Cardona et al., 2012) helps to illustrate how disasters and risk are

produced. Important determinants of the impact of a hazardous event are: where people live and work, their level of preparedness, hazard protection, governance, information, education, wealth, and health. Nevertheless, the circumstances above mentioned have nothing to do with nature *per se* as they are produced and exacerbated by socio-economic, socio-ecological, political and cultural factors (Pelling, 2003a; Wisner et al., 2004). Likewise, the vulnerability approach is based on the assertion that society has little control over sudden natural hazards (Davis, 1978), whereas vulnerability is solely a product of society (Wisner et al., 2004). This idea was developed by Wisner et al. (2004) in their disaster Pressure and Release (PAR) model, which focuses analytical attention on the social production of disasters. The PAR model treats the production of vulnerability as the outcome of the sequential operation of socio-economic and socio-ecological, political and/or cultural forces, a process referred to as the 'progression of vulnerability'. As shown in Figure 1.3, the concept of social production of disaster vulnerability is based on the idea that to understand disasters fully we need to track back the structural factors or 'root causes' and 'dynamic pressures' that materialise vulnerability.

**Figure 1.3. The disaster Pressure and Release (PAR) model**




*Source: Wisner et al. (2004), adapted by the author (2017)*

This thesis is 'standing on the shoulders of giants' in that its starting point was seminal works such as Hewitt (1983), Quarantelli (1978; 1998), Wijkman and Timberlake (1984), and Wisner et al. (2004), which asserted that to prevent disasters

and promote effective disaster risk reduction and resilience, it is essential to reduce vulnerability and to tackle its root causes. Reducing vulnerability should be a core policy objective of DRM and DRR, although one cannot neglect the probability of the occurrence of natural hazards, and their magnitude in specific social, cultural, economic and political contexts (Aragón-Durand, 2007; Wisner et al., 2004). There has, however, been little research on policy responses to disasters and decision-making as causes and drivers of vulnerability and risk; multi-level studies have tended to focus on infrastructural causal factors and institutional susceptibility to disasters (MOVE project, 2012).

Adopted here that serves as key register on which I ground the present work is the concept of 'scale'. By scale I refer to the succession of two or more social, economic, ecological, geographical, political and cultural spaces differentiated by size, level, and relationally (Howitt, 1998; Montello, 2001). Throughout the thesis I used the concept of 'geographical scales' to capture aspects of social, economic and political order and their spatial configuration at different levels. Two important aspects to consider here vis-à-vis the debate around disaster vulnerability and risk are: a) scales are social constructions and b) scales need to be considered relationally. The first point is stating that social relations and struggles produce geographical scales as they need space to delineate their scale: locally, regionally, nationally or globally (Swyngedouw, 1992). Accordingly, the spatial and scalar materialisation of social struggles varies over time depending on the extension and contraction of the struggle itself, making scales malleable and "historically changeable" (Brenner, 2001, p. 599). Consider, for instance, how geo-political boundaries have been transformed over the course of human history, and how the 'global' scale has contracted since the rise of ever faster transport networks and communication technologies (Castells, 1996). The second point relates to the relative nature of scales, in other words what make sense of one geographical scale –e.g. urban– is its relationship to other geographical scales –e.g. regional, national, global– (Brenner, 1998) through "its upwards, downwards, and transversal links" (Brenner, 2009a, p. 72). According to Brenner (2000), social relations are spatially demarcated through

the creation of specific institutional configurations such as national, regional and municipal governments. The resultant spatial 'unit' –e.g. urban, national, and local– of the social relationship indicates the function and dynamics of a given geographical scale, but this spatial 'unit' can be only grasped relationally in terms of its hierarchical links to other levels of a broader multi-scalar configuration. This is particularly relevant in the case of certain multi-scalar phenomena such as disaster vulnerability, for which the causal factors are nested, articulated, and distributed over multiple interconnected geographical scales. Thus, another aim of this thesis is to explore epistemological links between disaster vulnerability and geographical scales, referring particularly to how the spatio-temporal dialectic of decentralisation and centralisation struggles in Chile have affected DRM and DRR with regard to decision-making and policy response to disasters.

Finally, in Chaitén the risks and vulnerability to volcanic hazard and floods have not been significantly reduced, despite the efforts of policy makers, institutions and *Chaiteninos* over the first two years after the disaster (CIMM T&S Consultores, 2010; Ugarte and Salgado, 2014). Thus the main research question was: **How have policy responses to disasters influenced the progression of disaster vulnerability, at different scales, in post-disaster Chaitén?** Addressing this question entailed exploratory and inductive research, looking at how institutions, policy responses, and stakeholders at different geographical scales contributed to the production of vulnerability and how they should contribute to reducing it. To make it easier to address this primary research question I formulated some subsidiary questions that contribute incrementally to addressing the subject of study, working from the micro to the macro level:

- What are the 'unsafe conditions' in Chaitén that place people at risk of experiencing future disasters?
- Why have policy responses to disasters in Chaitén not effectively reduced vulnerability?

- How and why did the Chilean model of DRM facilitate the production and progression of specific vulnerabilities in post-disaster Chaitén?

These questions were intended to introduce the research inductively, that is, the research was intended to progress from more specific observations of the 'unsafe conditions' in Chaitén, to possible explanations, disciplinary debates, and implications for theory.

### 1.2 Methodology: research design and methods

Although the research strategy, methodology and methods used in this research are detailed in Chapter Two, an introduction of key considerations is necessary. The first concerns the epistemological debate about the production of disasters, risk and vulnerability. There are three main schools of thought in this debate, the behavioural paradigm (BP), the structural paradigm (SP) and the mutuality paradigm (MP). The BP couples a hazard-centred approach to geo-physical processes underlying disasters with a conviction that they can be anticipated by advancing societal knowledge of nature. The SP highlights the role of structural factors in society, such as social relations and structures of domination (Bankoff et al., 2006). Proponents of the SP advocate tackling the underlying (social) causes of disaster vulnerability as the most effective way of reducing disaster risks. The MP is the most recent and refers to the 'mutuality' of vulnerability and natural hazards due to complex interactions between nature and society (Hilhorst, 2006). The increased attention paid to environmental problems that have been linked to development and anthropogenic climate change is an indication of the MP's importance. However, despite its relevance it is relatively easy to lose focus when natural and social sub-systems are combined in a more complex system of environmental and social relations (Hilhorst, 2006). For that reason, and because my interests were centred on the aftermath of disaster and on rapid-onset natural hazards (intensive risk) such as mudflows and volcanic hazards in Chaitén in particular, I believed that the MP was less appropriate as a framework for my research than the SP, at least initially.

A second consideration was the attempt to bridge two bodies of literature with apparently different methodological perspectives. Whilst the production of disasters, risks and vulnerability is approached from a structural perspective, in disaster studies geographical scales are often considered from a positivist perspective (Fekete et al., 2010), that is as 'physical' manifestations within nature, as self-enclosed, static containers where social processes merely unfold (Brenner, 2009a). This positivist view contrasts with the idea of disasters as social constructions produced on and affecting multiple levels, and it may hinder observation of the relations between macro social processes and unsafe conditions at local level. For this reason, I adopted a social constructionist approach to geographical scales either. A social constructionist approach assumes that societal and individual knowledge, experience and perceptions are always historically, culturally, and linguistically mediated (Berger and Luckmann, 1966; Hacking, 1999). This means that perceptions of 'reality', including scales, disasters, vulnerabilities and their complex geography, are never a direct reflection of physical conditions 'out there'; 'reality' must be understood as a specific, situated and contingent reading of physical conditions (Berger and Luckmann, 1966). This thesis acknowledges the initial differences between these two core concepts, disasters and scales, but deals with them from a similar methodological perspective, namely the social constructionist perspective. This perspective is well known in disaster research (Cardona, 2006) as well as in literature on scales (Brenner, 2001; Marston, 2000), and it encompasses the methodological approaches used in this research, such as the study of historically contextualised socio-spatial relations.

The study of policy responses to disaster and decision-making at multiple temporal and spatial levels led to the selection of the PAR model as the analytical framework for this thesis. Within disaster studies, the PAR model is a well-known framework for supporting the construction of explanations based on the social causes of disasters, risks, and vulnerability (Wisner et al., 2004). The aim of this thesis, in using the PAR model, is to explore how vulnerability 'materialised' in space and 'accumulated' locally in Chaitén, and to describe how the territorial structure of the Chilean state

may have influenced the scalar distribution and organisation of DRM and DRR, and hence of policy responses and decision-making. Additionally, this thesis seeks to look at potential links between the literature on disaster and scales, as they are rarely dealt with together although they share conspicuous relations.

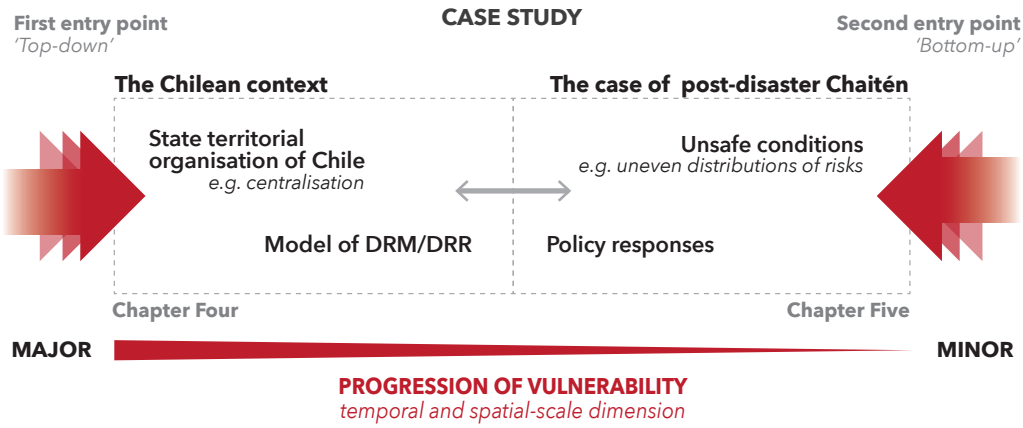
Although I am aware of the limitations of case-based research (Yin, 2003), another consideration that it is important to mention in this introduction is the use I have made of the 'case study strategy' to investigate "a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2003, p.13). In post-disaster Chaitén, the 'phenomenon' is the progression of vulnerability and risks, and the 'context' is Chile –Chilean institutions for DRM and DRR, policy response to disasters, and Chilean territorial organisation– the context in which 'root causes', 'dynamic pressures', and 'unsafe conditions' are situated.

The main step in the operationalisation of the intellectual approach set out here, including the PAR model, consisted of drawing a provisional storyline of events and processes in post-disaster Chaitén, covering the period from May 2008 to early 2014, similar to Figure 1.2 on page 22, and explained later in the methodological second chapter. The aim was to identify key moments and periods, as well as processes and mechanisms, in which the state and the Chaitén community interacted on various levels to produce certain specific 'unsafe conditions'.

Because the research moved between the policy response context in Chile and the Chaitén disaster, I considered it crucial that the national level be considered first, as it contextualises the policy responses and decisions made by national, regional and local governments during and after the Chaitén disaster. Figure 1.4 below explains briefly that the case study is addressed from two different entry points. One could be called the 'top-down' entry point, as it attempted to reflect the progression of vulnerability in Chaitén from general processes in Chile such as its state territorial organisation and model of DRM. In contrast, the second could be called 'inductive' or 'bottom-up', because it tried to reflect the progression from the specificity and

locality of Chaitén, that is, from its unsafe conditions, policy responses and decision-making. This diagram will be used several times during the empirical fourth and fifth chapters to articulate the case study from these two entry points.

**Figure 1.4. Case study entry points**




Vulnerable conditions in Chaitén were identified using qualitative methods such as interviews, focal groups and field observations, as well as through the analysis of secondary sources such as research outputs and grey literature. Interviewing and document analysis became the most important methods of collecting data on how different institutional forms of DRM and DRR, policy responses and decision-making processes emerged and influenced people's vulnerability. I used the term 'institutional forms' to refer to formally or informally codified social practices or structures that govern some behaviour within society (Brenner, 2009a; Ostrom, 2010), the term encompasses both formal and informal organisations. The storyline of post-disaster Chaitén was complemented by analysis of the historical formation of geographical scales in Chile, with particular attention being paid to the repercussions of such formation for the scalar configuration of DRM and DRR. For this reason, I analysed relevant political events by examining historical documents such as history books, archival records in libraries and national databases, research papers and grey literature. The storyline gave me an overview of the multi-scalar process of vulnerability production in the post-disaster context of Chaitén, as well as

allowing me to work out the relationships between the wider processes of political and economic centralisation and local vulnerabilities.

Field research was carried out between early March and mid-September 2013 with one collaborator, in three different places in Chile: Chaitén, Puerto Montt (the capital of Los Lagos Region), and Santiago de Chile. Final interviews were carried out and answers to follow-up questions were obtained remotely, via telephone and email correspondence. Some information, and peer feedback, was collected through participation in academic events such as conferences and seminars in Chile, Germany, and the United Kingdom between 2014 and 2015.

Interviewees were selected and approached using a snowball stratified sampling technique. As the research was inductive, interviewing evolved from the 'informal conversational interview' to the 'general interview guide approach' (Gall et al., 2003), the former approach was used at the beginning of the study, when I visited Chaitén for the first and second times –in March and July 2013. Guided interviewing was often used with interviewees from the national and regional governments, academia, and civil society organisations. In total, I visited Chaitén three times, in March, July, and September 2013, and carried out 27 interviews, 2 focus groups, and several participant observations, as well as obtaining access to municipal records and documents. I also visited Puerto Montt twice, in July and September 2013. In Puerto Montt I interviewed a total of 7 people from the Regional Government and the regional division of the National Emergency Office (ONEMI), as these institutions had considerable influence on the relations between policy responses and decision-making and the community during the post-disaster phases. These interviewees were also selected using the snowball stratified sampling technique, but the choices were also informed by media archives and institutional reports. The same procedure was used for the rest of interviews in Santiago de Chile, where 32 informants from national government officials, non-governmental organisations (NGOs), and academia were selected. In the period of the fieldwork, a total of 66 individuals participated in in-depth and guided

interviews, focus groups, and telephone interviews. See a complete list of participants in the Appendix 1.

Other techniques used were field observations and analysis of documentary sources such as archival records, reports and accountability books issued by government institutions at national, regional, and local level, as well as items from media archives such as newspapers articles, press releases, documentary films, news interviews etc. In most of cases, document analysis was used as a complementary data collection procedure, in support of triangulation (Bowen, 2009), to establish convergence with or corroborate data from other sources such as interviews and observations. Field observations were conducted in accordance with the suggestions of Yin (2003): in group discussions and personal conversation between two or more participants with another researcher, assistant or mediator guiding the interaction. Participant and non-participant observations also took the form of walks through the North and South sectors of Chaitén and the surrounding areas. I made participant observations as a 'visiting researcher' and 'guest' in two disaster research centres in Chile, the Research Centre for Vulnerability and Socio-natural Disasters (CIVDES) at the Universidad of Chile (between March and August 2013) and the National Research Centre for Integrated Natural Disaster Management (CIGIDEN) at the Pontificia Universidad Católica de Chile (PUC) (in December 2014). On both visits I was able to observe diverse academic discussions and comments on policies, governmental efforts, and initiatives on DRM and DRR in Chile, and on the case of Chaitén. Both direct and participant observations were registered as written notes and pictures.

The methods used in the research are subject to several limitations. Possibly the most evident is the difficulty of generalising the study's findings. The fact that the study was case-based research, embedded in the historical and geographical context of Chile, and the post-disaster Chaitén community in particular, as well as being linked to a specific rapid-onset natural hazard –i.e. volcanic eruption–, makes deeper and robust explanations as well as the refinement of theory more difficult. For instance, it would have been interesting to carry out similar fieldwork in other

Chilean communities recently affected by intensive risks, for example the Calbuco volcanic eruption in April 2015 –also in Los Lagos Region– or to pursue a more detailed analysis of other processes and factors that have a critical influence on DRM and DRR, such as public spending and budgeting. In practice I was only able to approach these similar cases and processes though secondary sources such as media archives and institutional reports. Nevertheless, the historical analysis of scale formation in Chile and its repercussions for the configuration of DRM and DRR is original, as is the application of the PAR model to a Chilean case.

As well as these empirical limitations, there are other methodological limitations that affect the contribution this research makes to debate within the disaster studies discipline. Perhaps the most obvious is that the study was framed within the Structural Paradigm and takes a political economic perspective, which limited the analysis of social structural factors and meant setting aside environmental and socio-ecological that are also important to understanding of disasters. However, I believe that using the case of post-disaster Chaitén to investigate socio-environmental relations surrounding disaster would have been inappropriate, because the Chaitén disaster was intimately tied to a rapid-onset natural event. Another limitation relates to the fact that I collected most of the data personally, and probably influenced the responses and behaviour of interviewees in some way. Likewise, the analysis and interpretation of data, as well as the delineation of findings, is unavoidably influenced by my history, views, values and beliefs (Yin, 2003), making this study subjective. However, because I was aware of my position within the study, of being a mestizo, heterosexual, cisgender male, and have lived in the southern Chile for most of my life, I tried to reduce bias by obtaining convergent data using several different qualitative methods, and by making use of peer review wherever possible. I have done my best to provide accurate explanations from the case study and its implications for efforts at disaster risk reduction. Throughout the thesis I indicate and warn the reader about these limitations and scope of this work. In the final chapter, I also point out several areas for future research.

## 1.3 Structure of the thesis

The case research process was iterative, oscillating between the macro and micro, making bidirectional connections between general Chilean processes and locally specific processes contributing to materialisation of vulnerability in Chaitén. The structure of the thesis therefore warrants explanation. The structure mirrors the bottom-up development of the research, which moved inductively from the case study to theoretical issues. Chapter Two presents the methods used and discusses the research methodology. Chapter Three sets out the disciplinary concepts of disaster, risk, vulnerability and scales as well as their theoretical implications to give the reader a sense of the debates in the field. This chapter also outlines the analytical framework used to interpret the case study data and findings. The next two chapters are interlinked and present the case study itself. Chapter Four analyses the historic and administrative-territorial context of Chile, offering a close look at the Chilean model of DRM and DRR. Chapter Five describes and analyses the localities and the material conditions of post-disaster Chaitén. The final part of the thesis offers conclusions that connect the findings of the case study to the general debate on recovery and vulnerability and to the research questions.

Chapter One introduces the thesis and the next chapter discusses the research strategy and the methodological design in more detail. Over four sections I seek to connect the study approaches with the methods for literature review, as well as with the fieldwork and its techniques for data collection and analysis. I introduce the debate around vulnerability, disasters, and scales to develop the research questions and limitations of the study.

In Chapter Three I set out the theoretical background of the thesis and the analytical framework. Over five sections I discuss historical views and interpretations of disasters and risks, looking at disasters as 'acts of god' and as 'acts of women and men' and describing how interpretations of disaster have evolved. I look at the different disciplines dealing with disaster phenomena, describe the current state of disaster research and then discuss the re-problematisation of the progression of

vulnerability and risk. This forms the basis for a detailed discussion of disasters as social constructions that situates the study within the Structural Paradigm. I argue that vulnerability is a key factor in tackling the problematic of disaster –i.e. its theoretical and practical conceptualisation, the debate about causality, and its factual reduction. Then I examine the literature and academic debate on vulnerability to disasters: this contains an historical review, facing physical, social, and ecological interpretations of vulnerability. In particular, I analyse the 'progression of vulnerability' through the PAR model, which enables me to introduce contemporary ideas about geographical scales to my analysis of vulnerability and its causes. The final sections discuss how the study of the geographical distribution and hierarchical organisation of certain socio-economic and political processes can help us to understand how vulnerability is produced, progresses and finally how it 'materialises' within specific communities and social groups at local scale.

After the chapter dealing with theoretical background, the thesis continues with two chapters –Chapter Four and Five– dedicated to the case study. Although the research process oscillated between macro and micro levels, I consider it vital to begin by providing a description of the Chilean context in which policy responses and decision-making during the evacuation, relocation and eventual reconstruction of Chaitén were embedded.

Chapter Four describes the history, institutions and territorial context of Chile. I start by offering a historical review of disasters in Chile in order to highlight the dominant narrative of Chilean disasters in its history, which emphasises their naturalness and sees them as a 'struggle against nature'. I explain how this view and some of the disasters Chile has experienced have influenced the creation and characteristics of the Chilean model of DRM and DRR. The next section is a historical review of the state territorial organisation of Chile, which has been characterised by political decentralisation and centralisation, based on how social processes have historically changed the national and sub-national geographical scales in Chile, and how today the relations between these scales is in terms of territorial administration. Chapter

Four ends with an analysis of the aspects of the institutional organisation of DRM and DRR that were crucial to policy responses and decision-making in post-disaster Chaitén: the ONEMI, the National Plan of Civil Protection (PNPC), emergency procedures, legal frameworks and territorial planning instruments (IPTs).

Chapter Five dives deep into the case of post-disaster Chaitén to explore policy responses and decision-making on emergency, recovery strategies, relocation, and reconstruction, and their effects on vulnerability and risk in the current Chaitén. In the early part of the chapter I describe the geography and economy of Chaitén prior to the eruption in 2008, and look at the crucial days immediately before and after the volcanic eruption, focusing on meetings between public authorities and people, the links between the supposed 'tectonic' movements and the lack of information, the 'dormancy' of the volcano and the evacuation and emergency response. Then I analyse the recovery strategy, including compensatory measures and decision-making at different geographical levels and by different actors, including politicians, government officials, regional and local authorities and *Chaiteninos*. The following can be considered 'outputs' of decisions about the disaster response: the 'occupied' city of Chaitén and the 'rebels', the New Chaitén project, subsidies and other benefits and the eventual reconstruction of North Chaitén. The final section attempts to articulate comprehensively both macro and micro levels of study –the Chilean context and Chaitén– by highlighting multi-scalar relations between centralisation and the geographical distribution and hierarchical organisation of DRM and DRR, as well as their repercussions for the materialisation of vulnerability in Chaitén.

Finally, Chapter Six aims to answer the research questions and offer general conclusions about the research process and set out the implications of the findings. In the quest for answers I link the research findings to the literature reviewed in Chapter Three in order to draw out the epistemological implications for the field of disaster research, specifically findings about how policy responses to disasters and decision-making in a context post-disaster may contribute, counterintuitively, to the production and reproduction of vulnerabilities and risks. Following this, I describe

some of methodological innovations and practical implications arising from the thesis. The methodological innovation involves the use of scatter diagrams to visualise a multi-scalar perspective for the analysis of vulnerability progression. The practical implications take the form of guidance on policy and practice that emphasises the need for holistic evacuations, planning and decentralisation of DRM. Finally, I offer some reflections about the research processes from my perspective as a researcher, and I call for further research that takes into account analyses of root causes and dynamic pressures at multiple scales into assessments of vulnerability.

# Chapter TWO
## Research strategy and methodology

### Introduction

This chapter introduces the research strategy and methodology adopted in this study. The goal was to analyse the relationships between temporally and spatially distant policies and governance processes, and the local 'materialisation' of 'unsafe conditions' in Chaitén. The following four sections outline the research plan, the research questions, theoretical propositions, methods for field research, analysis, and the limitations of the study.

The first section details the research strategy by introducing the primary and secondary research questions as well as the propositions, which aim to guide data collection and analysis. I summarise key antecedents from the literature on disasters and scales to connect the rationale of the study with the research question and analysis phases, such as those from social constructionist approaches to causes of disasters. In this section, I also deal with the justification, selection of and approach to the case of post-disaster Chaitén. I specify the units of analysis and other elements of the case study design such as the 'explanation building' method described by Yin (2003).

In the second section, I describe the research methodology. I initiate it by considering pros and cons of using quantitative and qualitative approaches for data collection vis-à-vis the nature of a case study and potential data, to substantiate the study as 'qualitative research'. Then, the post-disaster –i.e. from 2008 onwards– and research periods –i.e. March to September 2013– are explained, while the selection of the sub-fieldwork locations –i.e. Chaitén, Puerto Montt, and Santiago– is justified. In this section, I also describe the different qualitative methods and how they were applied during the study: in-depth and guided interviews; participant and non-participant observations; and document analysis. Finally, the study of the social production of geographical scales in Chile is approached from a historical stand

point, a view used as a 'proxy' to better understand the centralisation and top-down approach of the model of disaster risk management (DRM) in Chile.

The third section introduces the analytical framework of the study, characterised by the Structural Paradigm within the study of disasters, a social constructionist approach to disaster, vulnerability, and scales, and the Pressure and Release (PAR) model. The details of the analytical framework are then addressed and linked with the theoretical elaboration in Chapter Three.

Finally, the last part discusses some limitations of this case-based research and generalisation, both empirical and theoretical according to Ritchie and Lewis (2003), specifically on how the case of Chaitén may help to better understand the way in which policy responses to disasters may, counterintuitively, contribute to reproducing existing risks or producing new ones. Limitations were linked to the interpretative process of analysis and positionality, the scope of findings in relation to the composition of the sample –i.e. strata and size–, and the inherent limitations linked to the analytical framework and methods –i.e. PAR model and the omission of socio-environmental processes.

## 2.1 Case Study Strategy

A case study is an "empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2003, p.13). In the case of post-disaster Chaitén, the 'phenomenon' is the progression of vulnerability and its 'context' would be the Chilean system of rules, social relations, structures of domination, institutions for DRM and DRR, cultural practices, and all processes and circumstances where 'root causes', 'dynamic pressures', and 'unsafe conditions' are situated. Both the phenomenon and the context are inherently complex in the sense of being multi-dimensional, multi-level, and dynamic. Thus, the analytical framework and the research strategy must capture this complexity.

This case study investigated the progression of vulnerabilities by adopting the PAR model, which enabled exploring the structural factors of risks and disasters associated with governance, politics, and economic issues. Although some of these structural factors of risks have emerged in the literature on resilience and social-environmental change (Adger, 2000; Birkmann, 2006a; Aragón-Durand, 2009), the very problem of disasters –including the theoretical and practical conceptualisation, causality debate, and factual reduction– needs to be focused on the social tenets that 'govern' disaster causation, beside their very natural condition, to embrace more deliberately their political and social dimensions. With this position, this work situates itself in a political economy perspective of disasters and applies the PAR model as the analytical framework to guide the investigation.

According to Yin (2003), a case study should be selected as a research strategy when its application responds at least to one of five different uses:

> "To **explain** causal links when real-life interventions such as surveys and experimental research are too complex, to **describe** the intervention of a phenomenon and its real-life context, to **illustrate** diverse subjects in evaluated phenomenon, to **explore** those dimensions in which the evaluated phenomenon is not clear or when the study may be a **meta-evaluation**, that is, a study of an evaluation study".
>
> (Yin, 2003, p.15; own emphasis)

Thus, a case study was adopted given the rationale behind the research objectives. Overall, this study aims for a deeper comprehension of the social production of risks by **explaining** causal links between the productions of vulnerability in post-disaster contexts on different geographical scales. In doing so, it **explores** relevant and contemporary perspectives on disaster studies by incorporating the social science notion of geographical scales and **illustrates** the progression of vulnerability as a multi-scalar phenomenon. Yin (2003, p.21) proposed five fundamental components for a case-based research design:

- Study's questions;
- its propositions or hypothesis, if any;

- its unit(s) of analysis;
- the logic linking the data to the propositions; and
- the criteria for interpreting the findings.

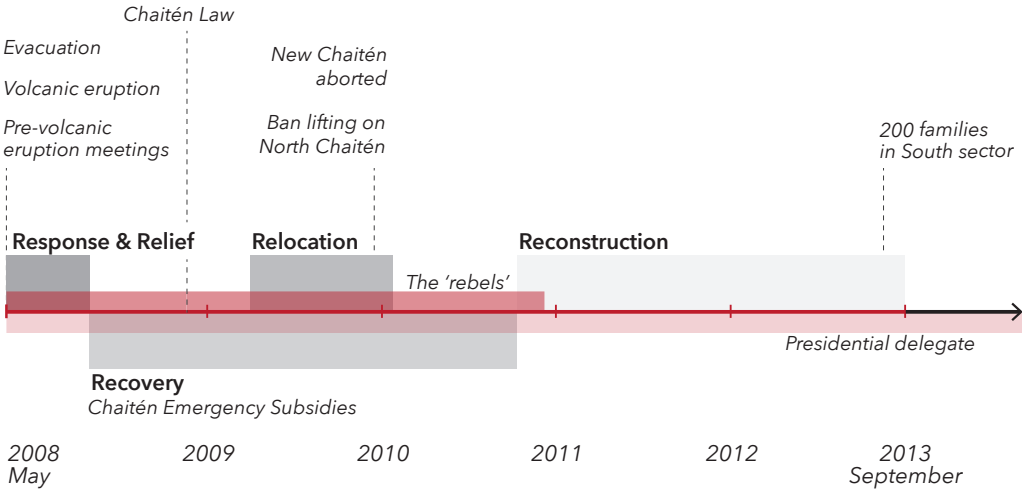
In this study, I adopted these five components and adapted them to the case of post-disaster Chaitén. The research questions, propositions, and units of analysis are outlined throughout this chapter, while the logic that links data with propositions and the criteria for interpreting the findings are delineated in tandem with the next chapter —the theoretical background and analytical framework. As can be seen, the latter two emerge from the literature and the analytical framework selected for this study, including the social constructionist approach to disasters, vulnerability, and geographical scales, and the PAR model, which guide the research analysis. The five components are important for the research design, as they represent a logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusions (Yin, 2003). However, before posing the research questions, I wish to briefly explain the reasons and motivations for selecting a case study. In terms of operationalisation of research, post-disaster Chaitén and the context of Chile have been selected as the object of this study mainly for four reasons:

*Academic interest*

Chile is constantly affected by natural extreme events —e.g. earthquakes and volcano eruptions— and is subject to the negative impacts of disasters. Thus, Chile offers a wide range of cases in which the 'root causes' of vulnerability, 'dynamic pressures' and 'unsafe conditions' can be investigated. Specifically, the recent case of post-disaster Chaitén offers a valuable opportunity to dig into a multi-scalar perspective on the progression of vulnerability, since Chaitén is a remote port-city located in Southern Chile embedded in a well-defined geographical and scalar configuration of national, regional, and local politics and social relations. By being geographically remote, and politically and economically distant from national and regional centres,

the case of post-disaster Chaitén is convenient to investigate as its actual 'local' vulnerability can be clearly separated from influential and distant processes occurring at macro levels –e.g. political shifts in the national government and political centralising forces. Figure 2.1 summarises the key distant processes and decisions that may have influenced the current situation in Chaitén. In grey blocks, the main post-disaster phases are depicted –response, recovery, relocation, and reconstruction–, while the red areas indicate relevant actors and their participation over time. Although each of these processes and decisions are discussed in greater detail in the following chapters, the figure reflects the interplay between national and local factors in the production of vulnerability in Chaitén.

**Figure 2.1. National-local interplay in post-disaster Chaitén**




Given its peculiar historical and geographical conditions, the case of post-disaster Chaitén works well to explore structural aspects of disaster governance and policy responses in Chile connected to a local materialisation of vulnerability, rendering evident the connections, for instance, between centralisation of decision-making in DRM and the 'erosion of trust in authorities' in Chaitén. Such reflections, however, could only be achieved through the combination of a locally based case study and the analysis of governance structures, institutions, and the multiplicity of actors involved in DRM. The case of post-disaster Chaitén is valuable because during the

emergency response, recovery strategy, relocation plan, and reconstruction of Chaitén –totalling about 4 years–, the Chilean model of DRM operated, without ambiguity, on different scales. The remoteness of Chaitén, as well as the spatial distance of Los Lagos Region from Santiago, allowed investigating and more easily distinguishing and differentiating national and regional processes from those nested at local levels.

*Contribution*

Despite the interest mentioned above, there are currently no studies investigating the progression of vulnerability on different geographical scales, or applying a multi-scalar perspective in the broader context of Chile. Additionally, disaster studies scholars have acknowledged the need for expanding knowledge on the social, economic, political, and cultural causal factors of disasters and vulnerability, and therefore the need to conduct more social science research from a multi-scalar perspective addressing both major and minor scale factors simultaneously (IRDR, 2012; UNDP and MINVU, 2014; UNISDR, 2011).

*Access and research support*

Chile has a favourable open access system for most of its governmental services, which includes historical repositories of reports, documents, legal frameworks, and the like. Among the governmental open access sites, 'Ley Chile' (BCN, 2017) by the National Congress Library is a key site, with access to an extensive archive of laws, bills, and other parliamentary documents. Similarly, the website 'SINIM' or National System for Municipal Information (SINIM, 2016) provides historical records on municipal governments' administration and expenditure. In addition, since 2008, political and government services are subject to Law N° 20,285 or 'Transparency Law' (Ministerio Secretaría General de la Presidencia, 2008), which ensures access to information on the administration of the state for any citizen.

*Language and reliance on secondary material*

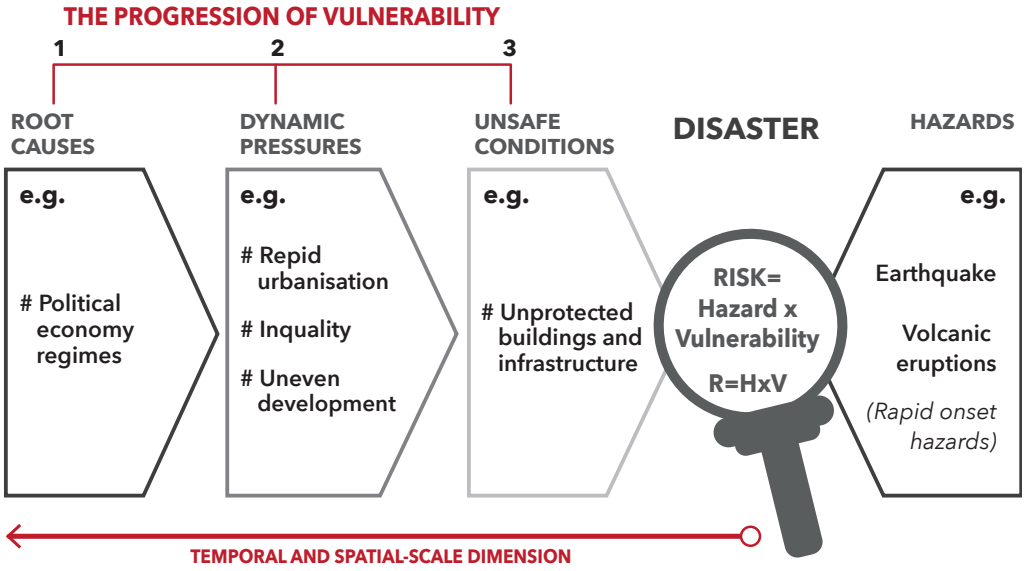
Given that an important part of this research is based on secondary material, my command of Spanish —my mother tongue and the official language in Chile— facilitates access and analysis of sources. Likewise, several sources were found from international organisations such as the World Bank or United Nations where most of the information, including on Chile, is published in English. Thus, my command of both Spanish and English provide an opportunity to expand the range of documentary sources.

### 2.1.1 Research questions

Before presenting the research questions, it is necessary to introduce basic ideas that sustain their rationale, specifically the multi-scalar progression of vulnerability, which is fully articulated in Chapter Three.

Disaster vulnerability is a multidisciplinary subject that builds on a wide range of substantive ideas such as entitlement failure and theories of hazards. Entitlement-based explanations of vulnerability have focused almost exclusively on the social realm of institutions, well-being and on class, social status and gender as important variables while vulnerability research on natural hazards developed an integral knowledge of environmental risks with human response drawing on geographical and psychological perspectives in addition to social parameters of risk (Adger, 2006). One approach to disaster vulnerability has been sketched out by Wisner et al. (2004) and conceptualised into the Pressure and Release (PAR) model. According to its authors, disaster vulnerability consists of the circumstances and characteristics of an element of interest —i.e. community, system, or asset— that influences said community's capacity to anticipate, cope with, resist and recover from the negative impacts of a natural or human-made extreme event, and likewise make the community susceptible to extreme impacts (Wisner et al., 2004). In this model, vulnerability production is modelled in a dynamic sequence of social, economic, and political forces at different times in a process named the 'progression of vulnerability' (see Figure 2.2).

**Figure 2.2. The PAR model and its potential scalar dimensions**




*Source: Wisner et al. (2004), adapted by the author (2017)*

The PAR model assumes that a disaster occurs at the intersection of two opposing forces: those processes generating vulnerability on the one hand, and natural extreme events on the other. The figure above depicts a 'nutcracker', with emphasis on the increasing 'pressure' on a given community or element arising from either side, from their vulnerability, and from the impact of a hazard (Wisner et al., 2004).

The PAR model highlights the 'progression of vulnerability'. Through this process, vulnerability is 'developed' and 'advances' from its 'root causes', 'dynamic pressures', to 'unsafe conditions'. Although the PAR model does not explicitly elaborate this, it does touch upon the multi-scalar dimension of the progression of vulnerability, proposing a hierarchically organised process that takes place in and through differentiated spaces over time. Wisner et al. (2004) and Pelling (2003a) have theorised that the 'root causes' and 'dynamic pressures' of disasters may be geographically dispersed and temporally distant from the affected area, and from the 'unsafe conditions'. While unsafe conditions may often be evident at local or

urban scales, root causes and dynamic pressures are articulated at major geographical scales: national and global.

Having briefly outlined the central feature of the PAR model, the essence of the research questions is, thus, oriented towards the epistemological debate on disaster vulnerability as a 'process': its production, progression, and ultimately its materialisation in the form of unsafe conditions for the people of Chaitén. Then, as the research is inductive, the construction of the storyline that answers the research questions is organised from the micro to macro levels, that is, from the specificity of the local unsafe conditions in Chaitén –e.g. erosion of trust in authorities– to widespread processes in the context of Chile –e.g. political centralisation.

The research questions are:

- What are the 'unsafe conditions' in Chaitén that place people at risk of experiencing future disasters?
- Why have policy responses to disasters in Chaitén not effectively reduced vulnerability?
- How and why did the Chilean model of DRM facilitate the production and progression of specific vulnerabilities in post-disaster Chaitén?

Thus, the principal inquiry that the above questions pose is: **How have policy responses to disasters influenced the progression of disaster vulnerability, at different scales, in post-disaster Chaitén?** All these seek to illustrate the scalar organisation within the social construction of disaster vulnerability, and to ascertain the 'scale' of the progression of vulnerability: its geographical extension, its socio-spatial hierarchisation, and its scale-specific materialisation.[1]

[1] By 'scale-specific materialisation', this study views disaster risk and vulnerability emerging and becoming evident at minor geographical scales namely local and urban (Maskrey, 1993a; 1993b; Pelling, 2003b).

### 2.1.2 Theoretical propositions

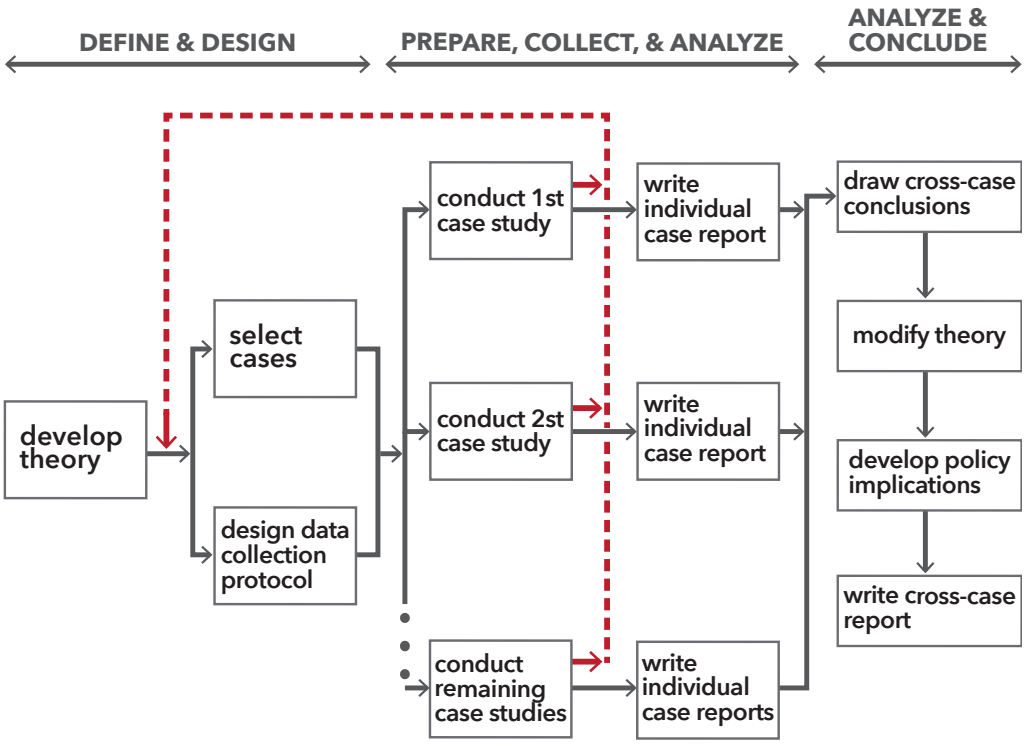
For Yin (2003), making a hypothesis or proposition explicit helps the researcher answer the research questions: "the proposition helps us to focus attention on obtaining data and to ignore other data" (Yin, 2003, p.111). The theoretical propositions are formulated to bring potential answers to the research questions that undergird the process of data collection and analysis to the surface. Based on these research questions, a number of propositions are established at two levels: one oriented at case-based research and the other addressing the theory and interdisciplinary debate on vulnerability and disasters.

- Disaster vulnerability in Chaitén persists despite various post-disaster efforts in part because policy responses did not consider the local reality, demands, and capacities of men and women in relation to their pre-existing social and economic conditions.
- The Chilean model of DRM and DRR policy responses to disasters is centralised in terms of decision-making and budgeting. Institutions dealing with DRM and DRR are organised in a top-down approach and distributed at different geographical scales, with the national level being the most powerful arena where decisions are made, while local actors' agency, capacities and expectations tend to be looked down upon.
- Policy responses are embedded in disaster governance structures that can be organised and distributed on different geographical scales. When policy responses to disasters do not consider local realities, demands, and capacities, as in the case of Chaitén, the progression of vulnerability can initiate its multi-scalar path to materialisation from distant root causes and dynamic pressures to local, specific, and unsafe conditions.

These propositions also aim to contribute to possible theories. In this case, although theory developments are linked to the bounded system of policy responses to disasters in Chile, they aim to expand our understanding of the social production of vulnerability by connecting policy responses to underlying factors of vulnerability

with a multi-scalar perspective. Yin (2009) asserted that theory development is both the basis and the starting point of the case study method. In this thesis, I developed research questions and theoretical propositions that are informed by relevant literature, although they were also refined by an iterative process of re-evaluation insofar as the data collected were suggesting potential contributions beyond those initially projected. The figure below shows the general case study method proposed by Yin (2009). However, the idea is to adapt this method to the case of Chaitén. In the next section, I will propose the research method of this study, alongside with the adoption of a single case study design and description of the units of analysis.

**Figure 2.3. The case study method**

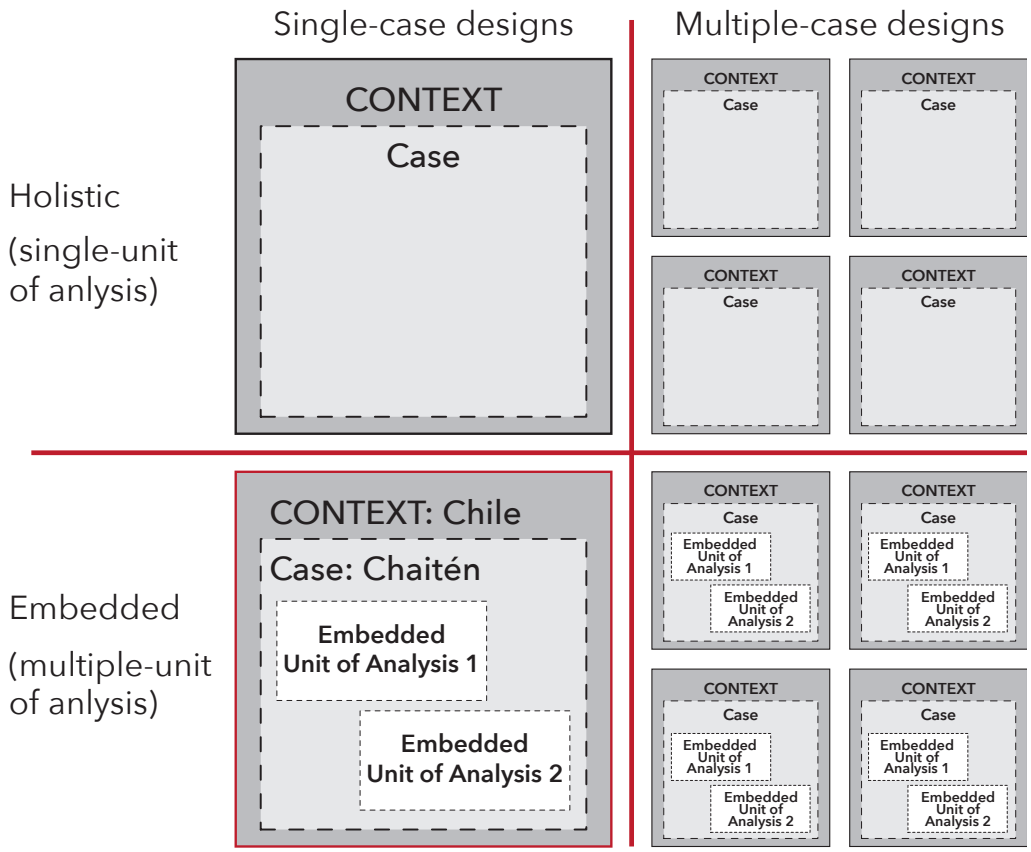



*Source: Yin (2009), adapted by the author (2017)*

### 2.1.3 Units of analysis, and other elements of the case study design

Case study research can be either based on a single or multiple cases, and also have a 'holistic' or 'embedded design' depending of the unit(s) of analysis determined for the study (Yin, 2003). In the case of Chaitén, the embedded design considers two units of analysis in a single case. Figure 2.4 shows Yin's basic types of designs for case studies.

**Figure 2.4. Basic types of designs for case studies**




*Source: Yin (2003), adapted by the author (2017)*

For Leedy and Ormrod (2010), the unit of analysis deals with the fundamental problem of defining what the 'case' is. For that reason, Yin (2009) asserted that a tentative definition of the unit of analysis is strongly related to the way the researcher has previously defined the initial research questions. From this

perspective, the scope of this research builds on a single-case design/embedded units of analysis of the relations between policy responses to disasters and the multi-scalar progression of vulnerability in post-disaster Chaitén from 2008 until 2014. As theoretical frameworks can shed light on the potential units of analysis too (Yin, 2009), I utilised the PAR model to identify two units of analysis: one that looks at the general institutional forms for and mode of DRM and DRR in Chile, thus touching upon the disaster governance structure as its context –this includes different institutions and actors as well as relations situated on different geographical scales. The other unit of analysis looks at the production of disaster vulnerability in Chaitén –i.e. unsafe conditions– through the processes and mechanisms of policy responses during evacuation, relocation, and reconstruction (see Figure 2.5).

**Figure 2.5. The research process**

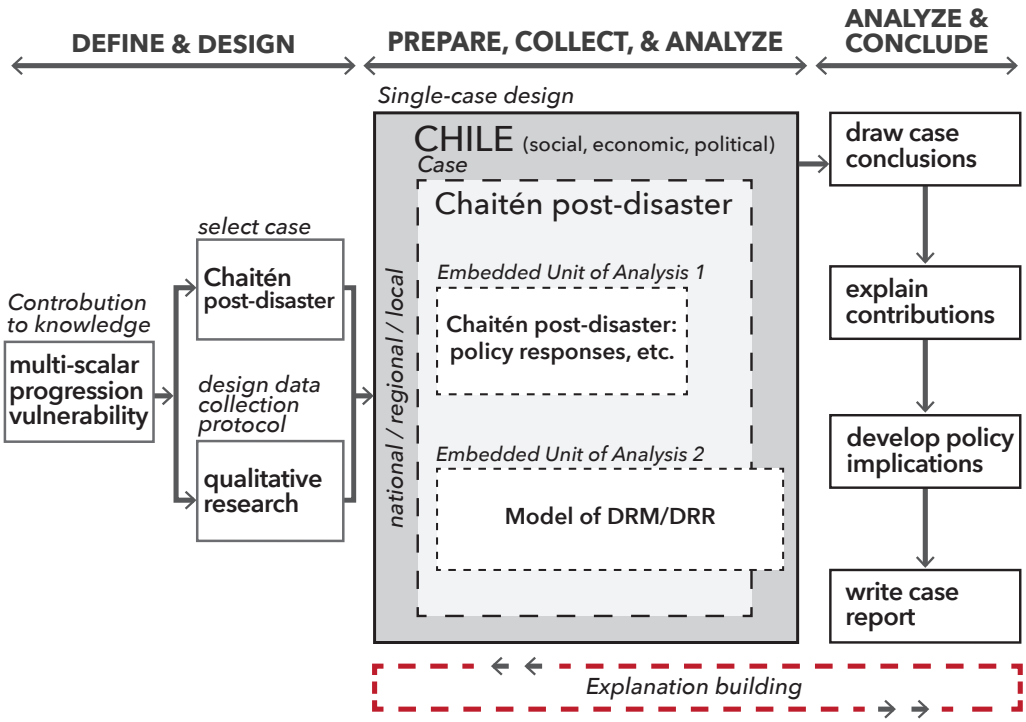



Figure 2.5 summarises the research decisions regarding the contribution to knowledge and to 'develop theory' in the field of disaster vulnerability. The study is defined as 'qualitative research' where qualitative methods and data sources are

drawn from: interviews, observations, and qualitative document analysis. As described above, the single-case design at hand encompasses two 'embedded units of analysis' that work to connect the research on different scales. The ultimate goal of this thesis is to arrive at conclusions that contribute to knowledge and to develop policy implications.

Likewise, the logic linking the collected data to the propositions is established through the 'Explanation Building' method (Yin, 2003). Essentially, explanation building consists of analysing the general case study data by building an explanation about the case and the phenomenon. In most cases, explanation building occurs in a narrative form that constructs a storyline around the data, the propositions, and the research questions. In this case, the basis as well as the structure of the explanation building is given by the PAR model, based on the way the progression of vulnerability occurs: root causes, dynamic pressures, and unsafe conditions. In order to increase precision, Yin (2003) appealed to the iterative nature of explanation building, then the following steps were conducted in order:

- Making an initial proposition about the phenomenon: e.g. disaster vulnerability in Chaitén persists despite various post-disaster efforts in part because policy responses did not consider the local reality, among others;
- Comparing the findings of the case against the statement of the propositions;
- Revising the propositions;
- Revising other details of the case against the revision;
- Repeat this procedure as many times as needed.

Finally, as mentioned earlier, the criteria for interpreting the findings is established through a social constructionist approach to vulnerability, disasters, and scales, and the PAR model. The rationale behind the selection of these approaches and frameworks is delineated in Chapter Three. In the following sections, I describe the research methodology, including the period of fieldwork, methods utilised, and an introduction to the analytical approach.

## 2.2 Research methodology

The research methodology utilised in this thesis builds on the case study method looking at the bounded system of policy responses to disasters, the model of DRM and DRR in Chile, and disaster vulnerability in post-disaster Chaitén. It aims to explore and describe specific linkages between temporally and spatially distant processes –e.g. policy responses, governance and decision-making, institutions–, and the local 'materialisation' of vulnerability in the form of 'unsafe conditions' in Chaitén.

In contrast to a positivist or naturalistic approach to disaster and risk, which see these as factual realities independent of subjective value judgements, the thesis' methodology deals with a constructivist approach, that is, with the power and functions of discourses and institutions in constructing the socio-natural 'reality' of risks and disasters, as well as with the role of the researcher –the observer– in the process of research (Cohen and Manion, 1994; Mertens, 2005). Thus, the methods and instruments for data collection, and the analytical framework employed in this study are tied to this constructivist approach. In the next chapter, I will explore different disciplinary and historical traditions approaching disaster, risk, and vulnerability to sustain these as social constructions. Hence, a component of this is the examination of disaster and scale literature. The literature review seeks to engage in the epistemological debate on the progression of vulnerability, the causes of disasters, and the implication of geographical scales, all crucial to approach and answer the research questions. On the other hand, by utilising the PAR model, I also try to articulate these two bodies of literature: as the PAR model implicitly refers to geographical scales as the arenas where root causes, dynamic pressures, and unsafe conditions are organised (Wisner et al., 2004). Then, the PAR model works not only as a main analytical register but also as a connector of literature bodies too. This operation is addressed in Chapter Three: in this chapter, however, I focus on the methods and the research design.

Before introducing the period of research and methods employed during the study, I briefly outline some considerations on the pros and cons of quantitative and qualitative approaches used in this study.

### 2.2.1 Considerations of quantitative and qualitative approaches

Here, some brief considerations for using quantitative and qualitative data and methods are presented to outline some methodological implications for the study, the fieldwork, and the data analysis.

*Quantitative*

Frequently, quantitative researchers must infer the cause and the effect of a given event through the selection of their independent and dependent variables –in which case independent variables are manipulated (cause) and the dependent are observed (effect). Nevertheless, this is difficult to apply in social research due to independent and dependent variables being unreachable (O'Brien, 2006). In the research of Chaitén, variables are not subject to manipulation. However, inferring about the causes and effects –i.e. root causes and unsafe conditions– can be made based on the quantitative evidence collected from secondary sources such as accounting reports and statistics. For instance, in Chapter Five, an analysis of the municipal budget in Chaitén accounted for the high dependence of the city on the national economy, revealing the hierarchical and vertical relationship between Chaitén and the state during recovery and reconstruction phases.

Both quantitative and qualitative methods seek to generalise their findings. Generalisation is using a sample to explain the whole. In quantitative methods, the idea that a sample could be representative of the whole is often used (Creswell, 1994). According to Creswell (1994), a researcher can generalise the findings of a given sample just until to the 'whole' from which it was obtained –i.e. a school, a town, a city and country–, but it can never be generalised beyond that sample frame. Thus, it does not matter how many surveys and questionnaires were used, it will be very difficult to get the complete picture of a given phenomenon, especially

social phenomena. For these reasons, this study does not attempt to generalise the findings into the general debate on the social production of disasters, but rather aims to provide insights for the refinement of a theoretical debate. Likewise, the scope of research findings can represent, in the best case, the contemporary Chilean context.

*Qualitative*

According to O'Brien (2006), qualitative research is difficult to replicate. Most case study procedures and methods are collected and followed by the researcher as well as the data analysis. Most critiques point out that the researcher's findings are affected by his or her interests, about how he or she decided to put attention on one or another element or people, and so on. Aware of these limitations of qualitative methods such as in-depth interviews and participant observations –as they were used in the fieldwork– some measures were taken, such as triangulation. As Creswell (1994, p.8) explained, "being objective is an essential aspect of competent inquiry, and for this reason researchers must examine methods and conclusions for bias. For example, standards of validity and reliability are important in quantitative research". One of these standards of validity widely used in qualitative research is triangulation through the use of multiple sources (Jick, 1979). In the study of Chaitén, triangulation was pursued through the use of multiple sources as a means of seeking convergence across different methods: interviews –stratified on different scales in Chile–, focus groups, field observations, and documentary analysis. For instance, unsafe conditions such as the 'uneven distribution of risks' between North and South sectors in Chaitén were corroborated by interviews, observations, and the analysis of socio-demographic and economic records.

In general, this study can be considered 'qualitative research' based on the type of evidence collected throughout the investigation, as well as the methods utilised. As mentioned in the introductory chapter, interviewing, participant and non-participant observation, and document analysis were the main techniques applied. Nevertheless, in several moments of the study, quantitative data from secondary

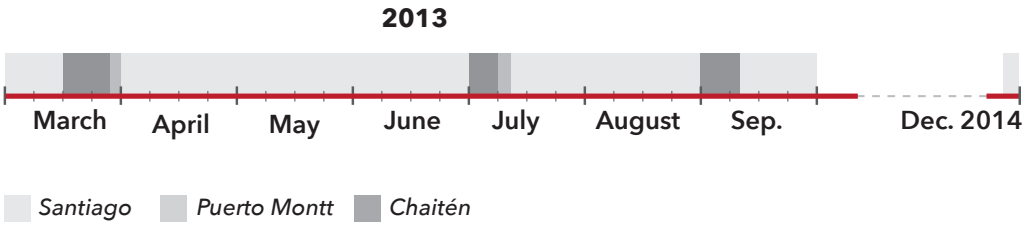
sources such as from government reports were collected and employed during the analysis: municipal budgets, public spending in DRM, among others. Here it worth mentioning that documents were mainly in Spanish. In this regard, I analysed them in the same language, although the results and quotes (if necessary) were in expressed in English. The method of documentary analysis, and others, is explained in greater detail in the section on research methods (section 2.2.3).

### 2.2.2 Period of research and feedback

The doctoral research began in September 2011, with enrolment in the MPhil/PhD programme at the Bartlett Development Planning Unit (DPU), University College London (UCL). Initial stages were centred on exploring the area of research, and examining a constantly expanding literature on relevant theory, and documents and published material regarding the Chaitén disaster.

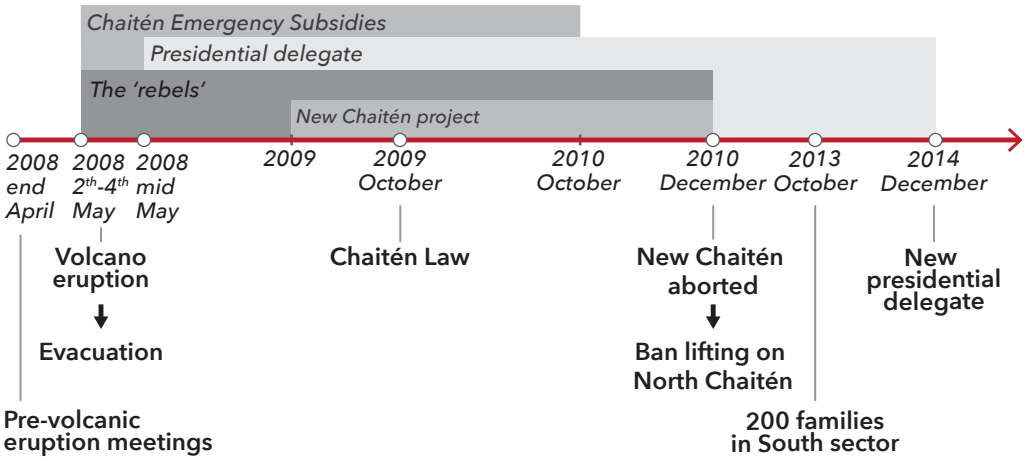
After upgrading from MPhil to PhD candidate in September 2012, the fieldwork research took place for one prolonged period of time, in order to optimise time and financial resources –Santiago de Chile is 12,000 kilometres from London, or about a 16-hour flight– and likewise because the fieldwork also considers several 'sub-fieldworks' within Chile. Figure 2.6 displays the fieldwork period between March and September 2013, and in December 2014 –almost 8 months in total. Selecting Santiago de Chile as the 'base station' for the fieldwork was due to most data sources –e.g. libraries and institutional collections– and interviewees from key institutions being located in the city. Several sub-fieldworks were carried out in the city of Puerto Montt –capital of Los Lagos Region– and Chaitén. I visited Puerto Montt in March and July 2013 for two or three days each time, while Chaitén was visited on three occasions: in March, July, and September 2013 for about one week each visit. During these periods, I conducted interviews in Santiago, Puerto Montt, and Chaitén, and focus groups and field observations in Chaitén and Santiago. Final concluding interviews and follow-up questions were obtained remotely via telephone, videoconference, and email.

**Figure 2.6. Fieldwork and sub-fieldwork periods**




Regarding the Chaitén disaster, the time span for analysis encompasses post-disaster events from May 2008 to late 2014, among them: the meetings held by regional government authorities, specialists and people prior to the volcanic eruption; the emergency response and evacuation; short-term compensations and recovery subsidy programmes; the political figure of the Presidential Delegate for the Chaitén disaster; the New Chaitén project; and the group of men and women that decided to return to Chaitén despite the ban to inhabit it –i.e. 'the rebels', see Figure 2.7.

**Figure 2.7. Chaitén post-disaster**




The figure above situates the investigated processes within the timeline of post-disaster Chaitén. The overlapping processes and decisions that were often controlled by national actors –although regional and local actors also mediated– portrays the complexity of the post-disaster timeline, and the challenges it posed for

the research design. A detailed exploration and analysis of these processes and decision, as well as their interrelations, are provided in Chapter Five.

Before addressing the research methods, it is worth mentioning here that valuable insights and feedback were collected through participation either as a presenter or moderator in conferences and seminars, in Chile, Germany, and United Kingdom between 2013 and 2015. The feedback I received during these events had an immense value since it helped me to test the robustness of the argument of the thesis, as well as to rethink some of the interviewees and institutions selected for the study. For example, in a roundtable[2] that took place on December 16, 2014, the ONEMI's national director Rodrigo Toro pointed out –referring to the presentation I did previously– the 'success' of the Chaitén case by arguing that nobody died. That 'self-confidence' attitude about the supposed 'success' intrigued me because it contrasted with the appraisal from Chaitén people. That guided me later to look at the 'life saving' discourse during emergencies within ONEMI's documents and politicians' media releases, and discuss it in a holistic preparedness for emergency response. Most of the feedback received during these events was documented in the form of written notes and audio recordings. A complete list of attended events can be found in Appendix 2.

### 2.2.3 Research methods

The case study methods introduced below look at the model of DRM and DRR policy responses in Chile and disaster vulnerability in post-disaster Chaitén. They aim to examine and characterise relevant relationships between temporally and spatially distant processes –e.g. policy responses, governance and decision-making, institutions–, and the local 'materialisation' of vulnerability in Chaitén. The selection of the methods also considered the post-disaster time span from 2008 onwards –so it required a historic review–, and the inherent complexity linked to the

[2] This roundtable took place within the 8th ChileGlobal Encuentros Conference. The session was called 'Disasters, Emergency, and Reconstruction in Chile'.

multiplicity of actors and their positions within a multi-scalar system, which required a stratification of interviews and documentary analysis.

*Interviews and focus groups*

An important part of the study and the fieldwork comprises conducting in-depth and guided interviews and focus groups with key informants and actors at different geographical and institutional levels: for instance, interviews with ONEMI officials at national, regional and local levels. I decided to use interviewing as a data collection technique for several reasons. Firstly, it allows for factually 'exploring' the case of post-disaster Chaitén, since at the start some processes and actors remained unclear or not confirmed. Thus, interviews being more like guided conversations rather than structured queries allowed for the stream of questions to be more fluid and exploratory, especially in-depth interviews at the beginning of the study. In addition to the ONEMI, informants from other relevant institutions were contacted, for example from:

- Congress of Chile
- Ministries of Interior and Public Security, Public Works (MOP), Housing and Urbanism (MINVU), Finance, Social Development, Agriculture, National Property, and the Ministry of Health (MINSAL)
- Subsecretariat for Regional Development and Administration (SUBDERE)
- Government of Los Lagos Region
- Provincial Government of Palena
- Municipality of Chaitén
- Neighbourhood and community organisations in Chaitén such as the 'Sons and Friends of Chaitén' and 'Potable Water Committee of Chaitén South', among others.

Experts, scholars, and practitioners at different geographical levels were also approached, including from universities, research centres, and NGOs. Among them:

the National Research Center for Integrated Natural Disaster Management (CIGIDEN) at the Pontificia Universidad Católica de Chile, the Research Center for Vulnerability and Socio-natural Disasters (CIVDES) at the Universidad de Chile, the Laboratory of Territorial Planning or *Laboratorio de Planificación Territorial* (LPT) at the Universidad Católica de Temuco, Universidad de Los Lagos, the Lift Chile Challenge or *Desafío Levantemos Chile*, Observatory for the Reconstruction or *Observatorio de la Reconstrucción*, and Ámbito Consultores.

As the research was inductive, the first batch of interviews took place in Chaitén in March 2013 to discern the actual vulnerability. Unsafe or vulnerable conditions described by interviewees during these first round of interviews were then converged alongside data collected through technical reports and scientific articles —these are properly referenced in Chapter Five. Eleven interviewees were approached using a snowball stratified sampling technique. Atkinson and Flint (2004) defined snowballing as a qualitative method for gathering subjects who then provide the names of other relevant actors. This technique was especially useful for dealing with the difficult problem of obtaining respondents as they were few in number and require higher levels of trust in order to initiate contact, such as the politicians and government officials contacted to talk about the Chaitén case[3] and the local leaders in Chaitén.

Taking advantage of my professional network, I contacted via email from London, in December 2011, two colleagues who worked in Chaitén post-disaster researching for academia and NGOs. They gave me an initial overview of potential key informants who could provide essential information about vulnerable conditions in Chaitén. One particular informant, Patricia Troncoso[4], a local leader who was immensely valuable in our first meeting in March 2013, provided me access to all

[3] In the initial interviews with government officials, there was a clear political tension around the Chaitén disaster as they first asked me not to record the interviews or not to use their name in any published material.

[4] Fictitious name. At the end of this section, on 'ethical considerations' I explain why I decided to use fictitious names for all research participants.

other local leaders, both in the North and South sectors of Chaitén. In most cases, I approached the interviewees in the company of a person who had referenced him or her previously. This was true for approaching most of the community leaders. On other occasions, for local government officials such as the Mayor and the Head of Police in Chaitén, I telephoned them using the contact details provided by other interviewees. In these circumstances, I always used the names of the person who gave me his or her contact details, in order to facilitate approaching the potential informant. Although the informants were mainly community leaders from different neighbourhood groups, there were also representatives from public services such as police, health, and firefighters in Chaitén. As the research was inductive, interviewing evolved from the 'informal conversational interview' to the 'general interview guide approach' (Gall et al., 2003), being first applied at the beginning of the study when I visited Chaitén the first and second time –in March and July 2013 respectively. Guided interviewing was applied often with interviewees from the national and regional governments, academia, and civil society. In the case of government officials, these interviews looked at the role of institutions and their decisions in relation to the evacuation, recovery, relocation, and reconstruction of Chaitén. Interviews with experts and relevant informants in Chaitén looked at the same relations but in combination with their perceptions on vulnerable conditions in Chaitén (see samples of interview records in Appendices 3 and 4).

Once the interviewees were contacted, I arranged the encounters at places where interviewees may feel comfortable to talk openly, such as in their offices, houses, and sometimes in cafeterias, and on the street. To conduct the interviews, I used my own experience in previous research and techniques described by several authors (Leedy and Ormrod, 2010; Nelson, 2012). I viewed interviews as personal encounters where social skills, avoiding judgemental attitudes, engaging with the respondent –but keeping track of the questions–, and active listening techniques were utilised –such 'please repeat', 'really?', 'tell me more about that'. Basically, the point was to let the respondents tell their own story on their own terms. I asked simple but direct questions such as 'What was your experience during the

evacuation?' or 'how did you and/or the ONEMI react when you received the emergency call from Chaitén in May 2008?' trying to elicit a descriptive answer from the respondents.

I always initiated the encounters by introducing myself and the objectives of the interview (very briefly), and I asked the interviewees to introduce themselves too. Subsequently, I continued with 'warming up' questions –something that the respondent could answer easily and at some length (though not too long)– in order to put us more at ease and make the rest of the interview flow more smoothly. Then, I started with the questions related to the subject of study, which varied from one interviewee to another depending of the institution or organisation and the geographical scale at which she or he was situated. In general, the conversations included these topics and structure: 1) presentation and introduction, 2) about the evacuation, 3) recovery –i.e. compensation, benefits and subsidies–, 4) the relocation and New Chaitén project, and 5) reconstruction. After 30 minutes and one hour, I started to end the interviews by mentioning that we were approaching the end at the same time I asked the final questions, and by making a short summary of the talk at the end –in case the interviewee desired to add or re-comment about something addressed or not in the interview. Finally, I always thanked them for their time and dedication, and I offered my contact details in case they would like to make further comments on the discussed topics.

In total, I visited Chaitén three times for 27 interviews, two focus groups, and several participant observations, and in some cases for accessing municipal records and documents: in March, July, and September 2013. I also visited Puerto Montt two times for interviews: in March and July 2013. In Puerto Montt, I interviewed eight people total from the Regional Government of Los Lagos and the ONEMI's regional division, as these institutions played an influential role in the relation between policy responses and decision-making and the community during the post-disaster phase. They were selected using the snowball stratified sampling technique too, but also informed by media archives and institutional reports.

In Santiago de Chile, I conducted 31 interviews during March until September 2013 and in December 2014 that included people from national government institutions, NGOs, and academia. Informants were contacted in different ways, with most of the executive government officials being approached through my personal and professional network, while in other cases, officials were approached through formal channels such as letters, emails, and telephone calls to their offices. Similar procedures were taken for approaching experts and practitioners.

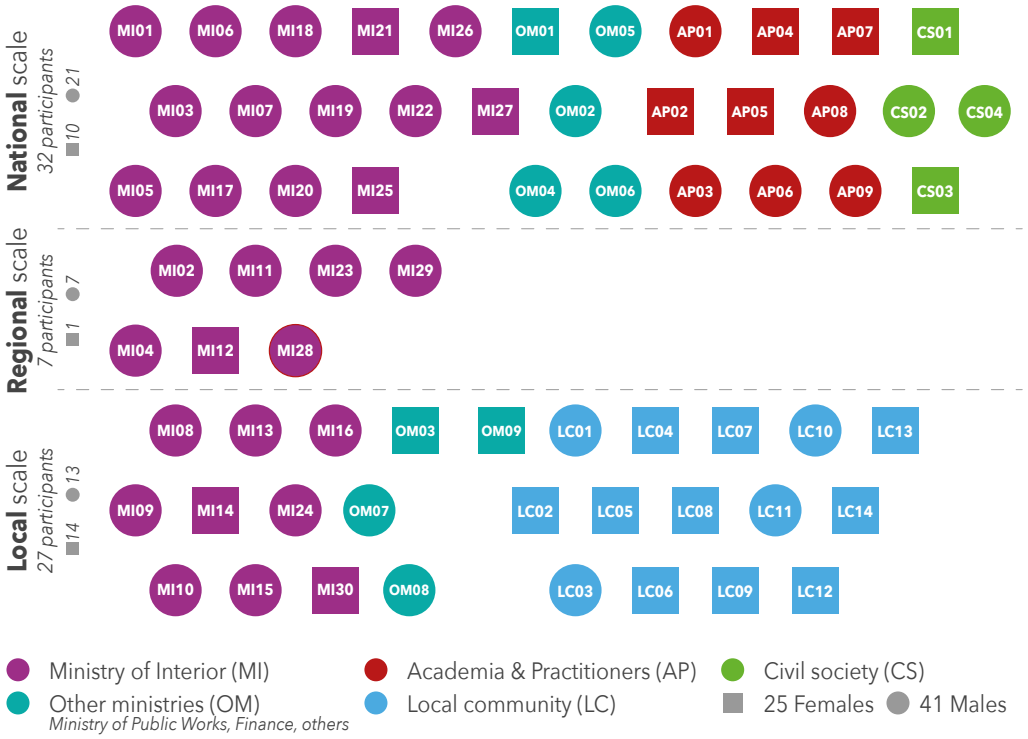
In a few cases, interviews were cancelled, and in other cases they had to be conducted by telephone because it was not possible to find a convenient date and time. It must be noted that the initial interview plan encompassed about 50 interviewees, however several interviews and interviewees suggested other relevant contacts who were accordingly contacted to be interviewed.

During the fieldwork in Chile to late 2014, a total of 66 individuals participated in in-depth and guided interviews, focus groups, and telephone interviews. This included any follow-up in the form of informal conversations on email or other verbal communications. In two sub-fieldworks in Chaitén, focus groups and interviews were assisted by another researcher, Cristian Albornoz Espinoza from the CIVDES at the Universidad de Chile who had been involved in previous research activities in Chaitén.

Alongside the sampling process, the interviewees' universe was stratified according to different levels of organisational hierarchy within relevant institutions and geographical scale. Figure 2.8 illustrates the various interviewees of the study. They are organised in relation to the institution or 'field' they were working in at the time when the interview took place –i.e. Ministry of Interior (MI), Other ministries (OM), Civil society (CS), Academia and Practitioners (AP), or Local people (LP)–, or at the time of the Chaitén disaster's occurrence –i.e. 2008-2013. Likewise, the interviewees were stratified in relation to the 'geographical scale' –i.e. national, regional, and local – by which their institutions/organisations are organised. Interviewees' identities were codified –e.g. MI12 corresponds to the interviewee N°12 of the Ministry of

Interior– for ethical considerations. Ethical considerations are addressed at the end of this section. The figure below shows an imbalance between regional and the rest of interviewees, however this can be justified because during the snowball stratified sampling, the names of informants and organisations involved in post-disaster Chaitén emerged spontaneously during the process. Indeed, this may be also an indication of the relatively marginal role that the regional government played during the process, something that will be addressed in Chapter Five.

**Figure 2.8. Research participants arranged by organisation and geographical scale**




Focus groups were not used extensively in the study: there were only two focus groups in total, both in Chaitén. As these are similar to group interviews where the value builds on the interaction within the group, on topics supplied by a researcher/ moderator (Morgan, 1997), they were used mainly as supplementary sources about potential unsafe conditions and the relation between the community and the state. The approach during the focus groups was similar to the one described above for

interpersonal interviews, although it considered pre-planning and recruiting, as well as moderating as essential elements for the correct development of the activity (Morgan and Scannell, 1998).

A complete list of participants in both interviews and focus groups can be found in Appendix 1, where information about them regarding gender, affiliation or group, position, and date of interaction is provided. Likewise, a sample of the preparation and execution of guided interviews and of one focus group arranged in Chaitén is available in Appendices 3 and 4.

*Field observations*

A second technique used in this study was participant and non-participant observations. According to Leedy and Ormrod (2010), the qualitative researcher may make observations either as a relative 'outsider' or non-participant and, especially in the case of an ethnography, as a participant observer. Observations in qualitative research are intentionally unstructured and 'free-flowing', owing to the flexibility of taking advantage of unforeseen data sources as they surface (Leedy and Ormrod, 2010). Yin (2003) asserted that both participant and non-participant observations are valuable sources because of their closeness to 'reality', as they allow the researcher to gather data in real-time, but also because observations are contextual, covering the context of observed events. According to Yin, "observational evidence is useful in providing additional information [...] for understanding either the context and the phenomenon being studied" (Yin, 2003, p. 93). For the above-mentioned reasons, and because I have had previous experience using this technique, I selected 'observations' as a complementary source of evidence.

In the study, non-participant observations occurred within some group discussions and team meetings in Santiago between two or more participants when another researcher, assistant or mediator led the interaction. These observations included spontaneous home meetings and sidewalk interactions in Chaitén too. These took

place in the North and South sectors in Chaitén and in surrounding areas. For Yin (2003), participant observations occur when the researcher is identified as such and/or when the researcher happens to be a part of the organisation or group being studied. During the fieldwork in Santiago, I participated as 'Visiting Researcher' in two research centres on disasters in Chile: in the CIVDES at the Universidad of Chile between March and August 2013, and in the CIGIDEN at the Pontificia Universidad Católica de Chile in December 2014. In both periods, I had the chance of observing diverse academic discussions and comments on policies, governmental efforts, and initiatives on DRM and DRR in Chile. Both direct and participant observations were registered in the form of written notes and pictures (these were properly indicated in Chapter Five). As recommended by Yin (2003), pictures were taken at several fieldwork locations as they help to convey important case characteristics to outside observers, to capture information that later may be useful for analysis, or can be used to represent insights on some specific contextual situations (see for example figures 5.23 in page 232 and 5.26 in page 239, Chapter Five).

*Document analysis*

A third research method and data source used in this study relates to the analysis of documents or document analysis. For Bowen (2009), document analysis can involve skimming (superficial examination), reading (thorough examination), and interpretation of texts both printed or electronic. The process is iterative and can combine elements of 'content' and 'thematic' analysis. Content analysis is the process of organising information into categories that can be useful to address the research questions, while thematic analysis is a form of pattern recognition within the data, with emerging themes becoming the categories for analysis (Bowen, 2009). In this study, however, I have tried to exclude the quantification typical of conventional mass media content analysis due to most of the documents utilised in the study having different 'content structure': this study included reports, media releases, newspaper interviews, historical books, websites, laws, legal documents, among many other types of documents. According to Corbin and Strauss (2014), quantitative document analysis is recommended when the content structure of the

sample is either equal or similar –e.g. books, press releases, or tweets from Twitter. In cases like this study where documents have very different content structures, document analysis can entail a first-pass document review, in which relevant passages of text or other data –e.g. pictures– are identified and then analysed (Bowen, 2009). In this regard, I first did a document sampling regarding the Chaitén disaster between 2008 and 2014 that encompassed documents from different organisations, institutions, and media. Of course, the document sampling was guided and accordingly stratified in accordance with the analytical framework defined previously –i.e. the PAR model. Thus, contents that pointed to certain 'root causes' were categorised differently from those that pointed to 'unsafe conditions' in Chaitén. Then, this sample expanded and contracted insofar as new data from interviews and field observations emerged.

Although most of the documents used in this study are properly referenced in text and the bibliography, a categorised list of studied documents is provided here:

- International reports: may be issued by private and non-private international organisations;
- Governmental reports: may be issued by ministerial departments and offices, it can include national reports, regional and municipal accountability reports, among others;
- Consulting or private reports: may be issued by consulting firms, companies, and universities, or from a combination of them –e.g. PUC et al. (2009);
- Laws: issued by the Congress of Chile or the Government of Chile and can include Supreme Decrees, Force-of-law Decrees, Bills, among others;
- Media archives: may be issued by public or private organisations, and may include text, audio, images, and/or videos;
- Press releases: generally issued by governmental bodies in written or recorded communication;

- Newspaper articles: issued by newspaper private companies both physically or electronically, including national, regional, and local newspapers;
- Scientific articles: issued by academic publishers.

The rationale for document analysis lies in its role in methodological and data triangulation, and the immense value of documents for investigating events in the past (Bowen, 2009). This is especially true for a historical analysis of the geographical scale formations in Chile and its relation to the model of DRM and DRR, thus, document analysis was used as the predominant research method.

The data collected from documents were continuously contrasted with other sources including key informants and field observations. To achieve greater validity for the data collected, triangulation was always pursued. Triangulation has been broadly defined (Denzin, 2009) as the combination of methodologies and/or sources in the study of the same phenomenon. The triangulation metaphor is borrowed from a navigation and military strategy that uses multiple reference points to locate an object's exact position (Jick, 1979). Thus, qualitative studies can improve accuracy of their judgements by collecting different kinds of data, and using different technique and methods (Jick, 1979). In this study, I decided to rely on the combination of different methods of data collection as well as the use of quantitative and qualitative data to provide more reliability and accuracy of findings.

*Ethical considerations*

Because of ethical considerations for primary research in the case of interviewing, few interactions were recorded either using audio or video. This decision was made considering the pros and cons of recording and transcribing interviews (Nelson, 2012): recording devices introduce different dynamics into the social encounter of the interview, and transcription can be a very time-consuming process, especially when the interviews are conducted in a language other than the one selected for the study. I was also looking to "encourage openness and the establishment of trusting relationships with the interviewer" (Diamond and Allcorn, 2009, p.185). The Chaitén

disaster had an important political impact for both government officials –e.g. the forced resignation of the regional governor or *intendente* in 2009– and left-wing parties in rule as they lost the elections against a right-wing coalition in 2009. These reasons, I assumed, may explain why several government officials asked me beforehand not to record the interviews. In addition to this, the requirements of the UCL Graduate School Research Fund (which partially funded the fieldworks) and the UCL Research Ethics Committee requested that I ensure confidentiality of human participants during fieldworks. Finally, I decided that all interviewees were protected by confidentiality and anonymity. In order to facilitate reading and understanding, fictitious names were used for the interviewees while gender, institutional affiliation, position and date of interaction is provided.

Of those recorded interactions, most of them were transcribed or partially transcribed. All sources quoted in the thesis are from those transcripts. In addition to the aforementioned transcriptions, most of the interviews were registered in summary form as written notes (see an example in Appendices 3 and 4). These notes were also transcribed and expanded upon immediately after each interview.

### 2.2.4 History as a 'proxy' to approach geographical scales in Chile

As in statistics, proxy variables or indicators are often used as an indirect measure or sign that approximates the phenomenon and its characteristics in the absence of a direct indicator (Miller, 2007). One of the study's objectives is to understand how the progression of disaster vulnerability may unfold through geographical scales, considering these as social constructions, that is, that scales are not necessarily a preordained framework or ontologically given categories for ordering the world – local, regional, national and global. They are instead "a contingent outcome of the tensions that exist between structural forces and the practices of human agents" (Marston, 2000, p.220). Then, the idea of a multi-scale analysis required me to deepen the history of certain socio-spatial and structural processes that can explain as well as describe the current state territorial organisation of Chile, in terms of its spatial, political, economic, and social organisation.

The study of geographical scales in Chile will be the focus of Chapter Four as a 'proxy' as it aims to inform the analysis of causal factors and processes of disaster vulnerability in Chaitén through the history of the territorial structure of the Chilean state. This seeks to assist the analysis of key characteristics of the state model of DRM or any other institution potentially involved in the progression of vulnerability, being either de- or centralised, top-down or bottom-up, pro- or reactive, and so forth.

In this regard, Brenner (2009a; 2009b) and Marston (2000) recognised that 'institutional forms' have proven to be an invaluable analytical element to conceptualise geographical scales. For instance, 'education' –as a social phenomenon– is institutionalised at different levels and configured at different geographical scales, from the national to the local: Ministry of Education, Regional departments or sub-agencies, schools and universities at urban levels, and so forth. Likewise, the geographical organisation of institutional processes on education may include national policies and laws, regional regulatory frameworks, and municipal ordinances. Although I only investigated the social construction of scales in Chile from a historical perspective based on document analysis (see section 4.2), the main objective was to link some general processes of scalar formation with the geographical distribution and hierarchical organisation of the DRM in Chile, thus enabling a multi-scalar arrangement of the 'root causes', 'dynamic pressures', and 'unsafe conditions' within the progression of vulnerability for Chaitén. Chapter Four illustrates the territorial structure of the Chilean state since its independence from the Spanish empire in 1810 until its contemporary form.

## 2.3 Introducing the study's analytical approaches

The main analytical framework utilised in this study is the PAR model. However, this needs to be considered in light of three other approaches which mediate the process of analysis too: social constructionism, complexity, and cause-effect. Although the analytical framework is addressed in Chapter Three, I briefly delineate each of these approaches as follows.

The overall analytical approach is situated between social constructionist perspectives on disasters, vulnerability, and scales. A social constructionist approach posits that society and individual experience, including perception, is always historically, culturally, and linguistically mediated (Berger and Luckmann, 1966). This means that the perceived 'reality', including the one emerging from disasters and vulnerability in their different scalar materialisation, is never a direct reflection of physical conditions 'out there'. Rather, 'reality' must be understood as a specific reading of such material conditions (Berger and Luckmann, 1966). Thus, the analysis of the epistemological debate on disasters and scales —addressed in Chapter Three — is conditioned by this ontological stance (Echeverría, 2006).

In addition, a social constructionist and multi-scalar approach to the progression of vulnerability inherently relates to the problem of complexity, "in the sense that a great many independent agents are interacting with each other in a great many ways" (Waldrop, 1993, p.11). The countless number of socio-economic and political, ecological and cultural processes and circumstances that may intervene in the process of vulnerability characterises the complexity of interactions between society and nature as well as the unpredictability of causal chains in disasters (Hilhorst, 2006). Thus, a necessary task has been to somehow delimit complexity to a manageable dimension for grounded research, such as the present one. This has been achieved through the use of the PAR model as a cause-effect framework.

In a similar fashion, disasters have been historically interpreted in terms of cause-effect (Etkin, 2014): ancient cultures used to explain disasters as divine punishment, and in the modern era people have explained disasters as 'natural' events. With the rise of constructionist approaches in disaster studies (Cardona, 2006), recent models of disasters are based on the idea that societies have the ability and capacity to determine their experiences, and to view such events within their locus of control (Etkin, 2014). This positivism, and the cause-effect approach, are strongly linked to the seventeenth and eighteenth centuries paradigms of rational thinkers such as Newton and Descartes, and can even be traced back to Plato (Etkin, 2014). As

Hilhorst (2006) and Etkin (2014) asserted, classical rational and positivist notions of disasters have given rise to more constructionist approaches as a result of the development of political ecology theories and chaos theory. The complex and chaotic inherent nature of disasters and vulnerability, "although bounded, can be highly unpredictable and can exhibit surprising emerging properties. This has led to a shift from management approaches that are deterministic to ones that are adaptive and that recognise limitations to the degree to which humans can control parts of their environment" (Etkin, 2014, p.202). Although the approach adopted in the study aligns with the cause-effect approach described above, it contests that single causes give rise to simple effects. Rather, this study refers to 'cause-effect' in the sense of complexity, that is, as 'cascades': as cumulative and non-linear sequential processes that may trigger complex effects such as disasters (Wisner et al., 2004).

The PAR model, as a key analytical dimension, helped to tame such complexities for several reasons: first, it is built on a cause-effect perspective (Wisner et al., 2004) and complexity is delimited to structural factors within a social realm. Second, the progression of vulnerability that is adopted in the PAR model inherently describes a scalar organisation and distribution of causal factors of risks and disasters —e.g. global widespread processes linked to local unsafe conditions. Third, as a very common tool in disaster studies, it adjusts very well when applied to case-based research, and there are several interesting case studies that can provide supporting material for comparing methodologies and analyses (see examples in Dahlberg et al., 2017; Wisner et al., 2004).

## 2.4 Limitations of the study

The most obvious methodological challenge was the generalisation of the study's findings. Although several methodological measures were taken in order to improve accuracy, such as triangulation, I was aware that this study is difficult to replicate as most of the analytical process was interpretative, and therefore, subjective (Yin, 2003). Likewise, although great emphasis has been placed on reliability and

accuracy by securing different and diverse data sources, I was also aware that the analysis and interpretation of data, as well as the delineation of findings, is unavoidably subject to the author's history, views, values and beliefs (Creswell, 1994; Ritchie and Lewis, 2003). Nevertheless, because I was conscious about my position within the study I did my best in trying to reduce bias by means of convergence of different qualitative methods, and by peer-review wherever possible.

In addition, the Chaitén disaster produced several political impacts within President Bachelet's administration in 2009, and possibly affected the subsequent presidential elections that year. So the interviews, in 2013, may have been charged with political tensions because Bachelet was participating in her second presidential campaign, which she won in November 2013. This may, then, have obscured the interviewees' perceptions about the circumstances and processes which they were describing. Alongside this, such perceptions may have also been affected by the relation of the interviewees with their employers: the fact that many of the interviewees were government employees at the time of the interviews may perhaps have affected their narratives.

Moreover, I acknowledge that the scope of the findings may be reduced due to the limited universe of interviewees as well as its composition. Because the research encompasses three differentiated territorial and administrative levels –i.e. national, regional, and local–, a larger number of interviewees may have produced a finer analysis of the case. Likewise, the composition and distribution of the interviewees within these three distinctive levels could be better balanced in terms of scale and gender (see Figure 2.8).

Another limitation relates to the fact that the study is framed within a Structural Paradigm or a political economy perspective (Wisner et al., 2004, Gunewardena and Schulle, 2008), which limits its scope and potentials to structural factors in society, leaving aside relations equally important for disasters such as environmental and socio-ecological ones –e.g. political ecology.

There are also other more practical limitations that relate to the methods utilised: in-depth and guided interviews, participant and non-participant observations, and document analysis. For instance, despite the strengths of interviewing mentioned earlier there are also weaknesses: a potential bias due to poorly constructed questions; response bias; bias due to poor recall; and 'reflexibility', as the interviewees can state what the interviewer wants to hear (Yin, 2003). The limitation of observations is also present: 'selectivity' unless broad coverage; and 'reflexibility' as subjects may proceed differently because they are being observed (Yin, 2003). Document analysis also has disadvantages that limit the study: 'insufficient details' as documents are for some purpose other than research, and in some cases for a specific audience, consequently their level of details may be narrowed, insufficient, and biased (Bowen, 2009). Throughout the thesis, I indicate and warn the reader about such methodological and practical limitations, as well as the scope of this work.

In conclusion, I would like to reiterate that despite such limitations, there has been a considerable contribution to knowledge, especially on how to advance policy responses to disasters in Chile, its governance systems and decision-making in relation to DRM. These empirical contributions, as well as other methodological and epistemological implications, are detailed in the conclusions of the thesis in Chapter Six.

# Chapter THREE: The social and multi-scalar progression of vulnerability

## Theoretical background and analytical framework

### Introduction

Not long ago, before the 1950s, disasters were mainly seen by people as 'Acts of God', as divine punishment to humankind for their evil ways (Etkin, 2014), and yet today the idea of disasters being matters of fate persist in some cultures despite the overwhelming evidence to the contrary (Burton, 2014; IFRC, 2014). This paradigm is acknowledged by several scholars (Boano and Lund, 2011; Wijkman and Timberlake, 1984) as the starting point for the interpretation of disasters and risks. The first historical shift that abandoned the idea of disasters as 'Acts of God' came with the advent of Enlightenment, rationality, and modern scientific thinking in the eighteenth century. Disasters and risk were seen as 'Acts of Nature' (Wijkman and Timberlake, 1984). Since then, natural extreme events such as earthquakes, *tsunamis*, and floods were synonymous with disasters (Etkin, 2014; Hewitt, 1983). The second and last historical shift in interpreting disasters is brought forth by the social sciences and the idea of disasters as social constructions (Cardona, 2006; Wisner et al., 2004). Wijkman and Timberlake (1984) referred to disasters as 'Acts of Men and Women' to interpret disasters as results of conflicting socio-economic, political, and cultural processes which, when translated into vulnerability, are 'triggered' by a given natural extreme event. This interpretation is the very starting point of this work. In the following sections, I present the theoretical background and the epistemological debate that uphold the thesis and its analytical framework.

Alongside the behavioural, mutuality, and structural paradigms introduced in Chapter One (page 29), I initiate this chapter by describing the social constructionist approach –nested in the Structural Paradigm which focuses on the role of structural factors in society, such as social relations and structures of domination (Bankoff et al., 2006)– in order to offer a conceptual and epistemological starting point for the

analytical framework of the thesis offered at the end of this chapter. The first section briefly addresses the history of interpretations of disasters and risks, which I believe is important for an interpretative perspective of the present and perhaps providing insights into how to refine our interpretations in the future.

After situating the constellation of disaster studies and the significance of the vulnerability approach (sections 3.1 and 3.2), the text proceeds in explaining and discussing the disaster Pressure and Release (PAR) model from a multi-scalar perspective. This is important because the PAR model is used both as a methodological and analytical tool: a compass that guided the methodology as well as the analysis of material collected in the fieldworks. At the end of section 3.3, I explain how 'geographical scales' are conceived as social constructions and how this perspective may contribute to a better understanding of the progression of vulnerability. Following mainly Brenner (2009a), Swyngedouw (1992) and Lefebvre (1991 [1974]), I refer to 'geographical scales' as differentiated spaces that are hierarchically related and organised for and within a form of territorial coherence. As in a vertical axis along which elements of interest are ranked or units of analysis are placed, like on a ruler (Fekete et al., 2010), a given single geographical scale —e.g. urban— should never be conceived and analysed in isolation (Brenner, 2001). Rather, they must be interrogated vis-à-vis its upwards, downwards, and transversal linkages within its scalar configuration (Brenner, 2009a).

With this perspective in mind, section 3.4 proposes understanding 'policy responses to disasters' and 'the model of disaster risk management and reduction in Chile' within a specific 'disaster governance' (Tierney, 2012). This approach was useful as it allowed me to grasp comprehensively the various aspects and forces that took place during the progression of vulnerability in Chaitén such as for example on decision-making. Then, the final section offers a synopsis of the analytical elements discussed throughout this chapter.

## 3.1 Interpreting disasters and risks

Today, a disaster is commonly defined as "a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources" (UNISDR, 2009a, p.9). International conventions, reports (IFRC, 2014; UNISDR, 2005; 2015b) and social science literature (Pelling, 2003b; Quarantelli, 1998; Wisner et al., 2004) often remark that disasters and disaster risk are a result of the interaction of a hazard –e.g. earthquake, hurricane, etc.– and the vulnerability of an element or system exposed (Birkmann, 2013), where disaster risk is "the potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or society in a specified future time period" (UNISDR, 2009a, p.10). This way of thinking is reflected in the conceptual equation:

**hazard × vulnerability = risk → disaster**

However, today's interpretations have not emerged from thin air. Boano and Lund (2011) have highlighted this historical transition of disaster interpretations from disasters as 'Acts of Nature' to becoming 'Acts of Men and Women' by describing how techno-centric perspectives are being substituted for a social constructionist approach. The techno-centric approach builds on interpreting disasters as 'natural' events, and therefore focuses on reducing disasters by means of physical research –e.g. geology, volcanology, engineering, among others– and investment in large-scale mitigatory infrastructures. Contrarily, the social constructionist approach is based on interpreting disasters as 'Acts of Men and Women', and therefore focuses on reducing disasters by means of tackling the social causes of vulnerabilities and risks.

This shift materialised during the 1980s (Quarantelli, 1987a) after the evident failure of techno-centric approaches and the increasing number of global disasters (Pelling, 2003b) which occurred despite the increase of 'technical' research, and the

investment on mitigatory measures worldwide (Hewitt, 1983). According to Quarantelli (1998), the failure of techno-centric approaches in addressing the problem of disasters lies in their misunderstanding of the multi-dimensional complexity of disasters.

In 1987, Quarantelli described that the word 'disaster' was introduced to the English language from French (*disastre*), which, in turn, was constructed from a derivation of two Latin words (*dis*, *astro*) –meaning something like "formed on a star" (Quarantelli, 1987b, p.8).[5] Thus, the origins of the word 'disaster' reflect the paradigm of time and a starting point in the interpretation of disasters, where such extreme natural events were interpreted as God's divine retribution for human failings (White et al., 2001). Subsequently, with the advent of rational thinking in the eighteenth century, 'disasters as acts of God' were substituted by 'disasters as acts of Nature' (Etkin, 2014). Finally, as Quarantelli[6] documented (1998), these 'common sense views' were then challenged by social science approaches. For Dombrowsky, Carr (1932) was "the first in the field to try to understand disasters in terms of social action" (1998, p.24). Carr wrote in 1932:

> "Not every windstorm, earth-tremor, or rush of water is a catastrophe. A catastrophe is known by its works; that is to say, by the occurrence of disaster. So long as the ship rides out the storm, so long as the city resists the earth-shocks, so long as the levees hold, there is no disaster. It is the collapse of the cultural protections that constitutes the disaster proper".
>
> (Carr, 1932, p.211)

Several decades later, authors such as Quarantelli (1977; 1998), Hewitt (1983), and Dynes (1970), as well as others, systematised and organised important social science contributions in the field of disaster studies. The flowering of social science research on disasters occurred during the 1990s and continues until today. As evidence of

[5] The English language has significance for disaster interpretation because studies have importantly been deepened and expanded throughout the twentieth century and the early twenty-first century, where English has become the primary language to communicate, disseminate, and present disasters studies' results and to discuss perspectives.

[6] Enrico Quarantelli died on April 3, 2017, at the age of 92.

such blooming, influential research groups or 'think tanks' emerged such as the Disaster Research Center at the University of Delaware on the 'sociology of disasters' in the 1960s, the Network of Social Studies in the Prevention of Disasters in Latin America (LA RED) in the 1990s, Radical Interpretations of Disasters and Radical Solution (RADIX) in the 2000s, and more recently, the Integrated Research on Disaster Risk (IRDR) in China, among others.

From another angle and more recently, Bankoff and his colleagues (2006) outlined the epistemological debate on the production of disasters and risks around three mainstream paradigms: the Behavioural Paradigm (BP), Structural Paradigm (SP), and Mutuality Paradigm (MP). The BP and ST paradigms, Hilhorst said (2006), are often presented within disaster studies as two rival paradigms. The BP used to dominate disaster studies in the 1950s promoting a techno-centred interest in geophysical processes underlying disaster and risks with the conviction that monitoring and predicting hazards, as well as people's behaviour to develop early warning mechanisms, could be enough to avoid disasters and risks. The same shift in disaster interpretations pointed out by Boano and Lund (2011) was made by Hilhorst in 2006:

> "Towards the 1980s, anthropologists, sociologists and geographers increasingly began to challenge the technocratic, hazard-centred approach to disaster. [...] Kenneth Hewitt (1983) postulated that disasters were not primarily the outcome of geographical processes. Especially in developing countries, structural factors such as increasing poverty and related social processes accounted for people and societies' vulnerability to disaster".
>
> (Hilhorst, 2006, p.38)

The idea of vulnerability touched at the heart of understanding disaster. Whereas disasters used to be practically a synonym for natural hazards, they were now understood as the interaction between hazard and vulnerability. This was the origin of the SP, and it was graphically expressed in the popular conceptual equation: hazard × vulnerability = risk → disaster by Blaikie et al. (1994). According to Hilhorst (2006), the solution proposed in the SP paradigm would be the transformation of social and political structures that breed poverty and the social dynamics that serve

to perpetuate it. Although BP and SP are still in use, a new paradigm in disaster studies grew in the 1990s, giving increased attention to environmental processes and human-induced climate change. The MP emphasises the mutuality of hazard and vulnerability due to complex interactions between the environment and society. While SP looks at society to explain people's vulnerability to disaster, MP looks at the mutual constitution of society and environment. From this view, "people are not just vulnerable to hazards, but hazards are increasingly the result of human activity" (Hilhorst, 2006, p.38), being particularly clear in the cases of the meteorological and hydrological processes producing high winds and floods. Nevertheless, despite its relevance within MP, it is relatively easy to lose focus when natural and social sub-systems are combined in a more complex system of environmental and social relations (Hilhorst, 2006). For that reason, and because the interests of this thesis centre around a 'post-disaster' case study and on a 'rapid onset natural hazard' in particular –i.e. volcanic hazard in Chaitén–, I believe that MP does not adjust to the study as the SP does as a starting point. The objective of this thesis is to re-problematise the social production of vulnerability, risks, and disasters.

## 3.2 Situating disaster vulnerability and its significance

### 3.2.1 Disaster and risk as social constructions

Disasters and risks can be framed within a social constructionist perspective as the factors that shape them can always be connected to socio-economic, political, cultural processes. The social construction of disaster challenges the dominant 'behavioural' view, but the perspective is itself not new. A brief analysis of disaster studies may contribute to illustrate innovative applications of social science disaster research that take into account economic, political and cultural dimensions altogether. Some contributions can be considered as 'social constructionist readings' in disaster studies. Authors such as Quarantelli (1998), Dombrowky (1998), Hewitt (1983), Pelling (2003b), Wisner et al. (2004), and Cardona (2006), but surely many others, asserted that disasters are, in the ultimate analysis, 'social constructions'.

In the book *Natural Disaster: Acts of God or Acts of Man?,* the authors Wijkman and Timberlake (1984) adopted a critical stance against the traditional-dominant views of that time –hazard-oriented and techno-centric approaches–, and specifically about disaster response and post-disaster processes. According to Wijkman and Timberlake (1984), disasters are more related to social and political circumstances than to natural ones, and they encouraged institutions to review their mode of action.

> "Most of the scientific effort and money devoted to natural disasters has been spent on studying the climatological and geological triggers –over which humans have very little control– rather than on studying the wide range of human actions –over which humans do have some control– which bring more disasters upon people every year. Contemporary natural disasters research has become 'the single greatest impediment to improvement in both understanding of natural calamities and the strategies for alleviate them".
>
> (Wijkman and Timberlake, 1984, pp.11-13)

Quarantelli (1998) collaborated with several authors from different social science schools in his book *What is a disaster? Perspectives on the question* to confront hazard-oriented and social science perspectives on disasters. Among the discussions, one issue raised was: "if workers in the area [of disasters] do not even agree on whether a 'disaster' is fundamentally a social construction or a physical happening, clearly the field has intellectual problems" (Quarantelli, 1998, p.3). What Quarantelli is describing here is the dichotomy of perspectives on disaster among naturalist and constructionist stances, geography and sociology schools, hazard-oriented and social sciences approaches, behavioural and structural, and so forth. With that, Quarantelli sought to promote refining concepts and ideas about disaster and risk with all perspectives agreeing, and thus providing an intellectual basis for its development (Quarantelli, 1998).

Certainly, there has been an intellectual shift towards the idea of disasters as social constructions in recent times. Quarantelli described one of these challenges as follows:

> "I might note that even formulation by sociologist and other social scientists that appear to be fully social constructs, but which use geographical space and/or chronological time as dimensions or factors in defining "disaster", in my view, are not using fully social construction concepts [...] they should use social space and social time features".
>
> (Quarantelli, 1998, p.3)

I took Quarantelli's advice and legacy seriously because if we agree with the idea of disaster and risk as socially constructed phenomena, then we should describe such phenomena from, and analyse them with, social science perspectives and techniques. For that reason, I decided to look at 'geographical scales' as social constructions too. I will come back to this in section 3.3.3.

### 3.2.2 The rise of the social production of disaster vulnerability

The origins of the social concept of 'disaster vulnerability' or 'vulnerability to disasters' can be traced back to the 1970s (Bosher, 2007). In 1976, Phil O'Keefe, Ken Westgate and Ben Wisner published a paper *Taking the 'naturalness' out of natural disasters* which introduced the idea that disaster risk may be at the interface between an extreme physical event and a vulnerable human population, and furthermore that disasters are irremediable consequences of an unbalanced relation between natural hazards and vulnerability shaped by socio-economic, political, and cultural factors (O'Keefe et al., 1976). Although disaster researchers between the 1970s and 1980s (Burton, 1974; Erikson, 1976; Hewitt, 1983; O'Keefe et al., 1976; Quarantelli, 1977; 1978; Wijkman and Timberlake, 1984) emphasised more and more the role of vulnerability within the causation of disaster, it was not until the 1990s when vulnerability to disasters was systematically proposed (Birkmann, 2006a). As a consequence of that process, several models were developed to unpack vulnerability, such as the disaster PAR model suggested earlier by Blaikie et al. (1994) –refined later by Wisner et al. (2004)– and the Hazards of Place Model of Vulnerability proposed by Cutter (1996), among many others (Birkmann, 2006b).

For many theorists (Bankoff et al., 2006; Sen, 1981; Wisner et al., 2004), what makes people vulnerable to disasters is a straightforward question about poverty, depletion, and marginalisation. Although Sen (1981) never researched disasters as such, he pioneered the introduction of an early conceptualisation of vulnerability by observing the occurrences of famines in India. Sen demonstrated that acts such as hunger, sickness, and deaths are set apart from the 'nature' of famines; on the contrary, responsibility for famine rests squarely with society. Perhaps motivated by Sen's observations, there was a 'flourishing' regarding the subject as several works on vulnerability to disasters were published thereafter (Hewitt, 1983; Quarantelli, 1987b). Some examples about how the conceptualisation of vulnerability evolved from general conventions such as the United Nations Disaster Relief Organization (UNDRO) and in the Hyogo Framework for Action (HFA) (UNISDR 2005) are presented as follows:

> "Vulnerability is the degree of loss to a given element at risk, or set of such elements, resulting from the occurrence of a natural phenomenon of a given magnitude and expressed on a scale from 0 (=no damage) to 1 (=total loss). [...] The factors that influence vulnerability include: demographics, the age and resilience of the built environment, technology, social differentiation and diversity, regional and global economies, and political arrangements".
>
> (UNDRO, 1979, p.5 and 8)

The above definition can be framed within the techno-centric 'dominant view' of the time because it tends to reduce the role of 'vulnerability' of the causes of disasters to 'the potential for loss', without referring to the characteristics and circumstances of a community. This also portrays the mainstream rationale behind the international community about how to effectively reduce disasters and vulnerability. There is a clear positivist stance in understanding and means to reduce vulnerability by the quantification of variables that may affect vulnerability, but not necessarily pointing out what produces them. Such positivist rationale can be exemplified by the 7th principle of the Yokohama Strategy and Plan of Action for a Safer World in 1994:[7]

[7] The Yokohama Strategy was the earliest global plan of action to address disaster risks and reduction as part of the UN International Decade for Natural Disaster Reduction (UN-IDNDR).

> "Vulnerability can be reduced by the application of proper design and patterns of development focused on target groups, by appropriate education and training of the whole community".
>
> (UN-IDNDR, 1994, p.8)

Alternatively, in the 1990s, a series of researchers critically explored other dimensions of vulnerability from different angles and disciplines. The geographer Diana Liverman (1990), for instance, explored the political economy aspects of environmental and climate change in the late 1980s. In her approximations, Liverman realised that the production of vulnerability to disasters could occur within political, social, and economic spaces in interaction with environmental spaces. As Liverman explained:

> "[The field of disaster research] distinguishes between vulnerability as a biophysical condition and vulnerability as defined by political, social and economic conditions of society. [...] Vulnerability is defined both in geographic space (where vulnerable people and places are located) and in social space (who in that place is vulnerable)".
>
> (Liverman, 1990, p.32)

Following this, two geographers, Susan Cutter in the US and Terry Cannon in the UK, deepened Liverman's observations by refining the distinction between space and place, and by placing emphasis on the 'interaction' of the socio-economic, political, and cultural processes within a given community and its environment. For Cutter and Cannon, vulnerability is:

> "The likelihood that an individual or group will be exposed to and adversely affected by a hazard. It is the interaction of the hazards of place (risk and mitigation) with the social profile of communities".
>
> (Cutter, 1993, p.522)

> "A measure of the degree and type of exposure to risk generated by different societies in relation to hazards. […] Vulnerability is a characteristic of individuals and groups of people who inhabit a given natural, social and economic space, within which they are differentiated according to their varying position in society into more or less vulnerable individuals and groups".
>
> (Cannon, 1994, p.16 and 19)

The above two observations were not isolated at that time but they represented out-of-the-box attempts to apprehend the complex web of physical, and especially non-physical world where vulnerability plays a principal role. Although for Cutter (1993) vulnerability is a 'likelihood' and for Cannon (1994) a 'measure', both definitions agree in the significance of the social factors that determine it, identifying disaster vulnerability with both internal (characteristics) and external factors (circumstances in society and nature). The latter could be linked with the initial and yet relevant interpretations of vulnerability given by the climate change researchers. With the rise of the climate change debate in both national and international political spheres, the concept of vulnerability was interrogated differently. Although the Intergovernmental Panel on Climate Change's (IPCC) emblematic report of 2001 is clearly oriented at vulnerability to climate change, it introduces the idea of 'adaptive capacity' and 'exposure' within the conceptualisation of vulnerability:

> "Vulnerability is defined as the extent to which a natural or social system is susceptible to sustaining damage from climate change. Vulnerability is a function of the sensitivity of a system to changes in climate (the degree to which a system will respond to a given change in climate, including beneficial and harmful effects), adaptive capacity (the degree to which adjustments in practices, processes, or structures can moderate or offset the potential for damage or take advantage of opportunities created by a given change in climate), and the degree of exposure of the system to climatic hazards".
>
> (IPCC, 2001, p.89)

IPCC, like Cutter (1993) and Cannon (1994), highlighted internal (sensitivity and adaptive capacity) and external factors (exposure) as constitutive elements of vulnerability. However, in thinking about how structural factors shape vulnerability, 'exposure' represents the inventory of elements in an area in which hazardous events may occur (UNISDR, 2004): if people or physical elements were not located in 'dangerous' settings, no problem of disasters and disaster risk would exist (Cardona et al., 2012). I recognise that 'exposure' and 'vulnerability' are related, but are distinct concepts:

> "Exposure is a necessary, but not sufficient, determinant of risk [and disasters]. It is possible to be exposed but not vulnerable, for example by living in a floodplain but having sufficient means to modify building structure and behaviour to mitigate potential loss. However, to be vulnerable to an extreme event, it is necessary to also be exposed".
>
> (Cardona et al., 2012, p.69)

In this sense, I intentionally focus on the conceptual equation 'hazard × vulnerability = risk → disaster' as in Wisner et al. (2004), thus considering that 'exposure' and 'vulnerability' are combined by means of a set of complex social, economic, political, and cultural relations (Hewitt, 1983).

In 2012, the IPCC produced the *Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (SREX), edited by Field et al. (2012), in which vulnerability is defined as an 'internal' factor but also as a 'result' of a wide range of physical and non-physical conditions and processes. This definition is based on an entire decade of documentation, research, and discussions:

> "Vulnerability is defined in this report as the propensity or predisposition to be adversely affected. Such predisposition constitutes an internal characteristic of the affected element. [...] Vulnerability is a result of diverse historical, social, economic, political, cultural, institutional, natural resource, and environmental conditions and processes".
>
> (Field et al., 2012, p.44)

Clearly, there has been an evolution of the concept of vulnerability. In fact, Field et al. (2012) touched upon a fundamental and yet problematic aspect of disaster vulnerability: being an 'internal' factor that depends largely on 'external' social and environmental conditions to become 'real'. Now that 'external' social and environmental processes are clearly important to understand vulnerability, the connection between these two spheres –social and environmental– becomes a central concern too. This connection is not always evident and clear for all hazards and cases. I think there is a fundamental difference on how the relation society-

nature operates in producing intensive risks in cases of rapid-onset extreme events such volcanic eruptions and earthquakes. In these cases, I believe that social processes need to be examined independently from the impacts that society can exert over environmental processes. Individual and community choices on living in extreme environmental places such as in volcano slopes, when these have not been mediated by social marginalisation and pressures, requires close attention. The case of Chaitén, however, is distinct from the latter as the volcano was completely unknown by people and institutions until the day of the eruption in 2008.

In 2005, the United Nations International Strategy for Disaster Reduction (UNISDR) adopts the Hyogo Framework for Action (HFA), a global plan to explain, describe and detail the work that is required from all different sectors and actors to reduce disaster losses (UNISDR, 2005). In the HFA's definition of vulnerability, it is a bit less clear on vulnerability's duality. However, the reference to structural and non-structural factors that define vulnerability, both internally and externally, is there. For UNISDR, vulnerability represents:

> "The conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards".
>
> (UNISDR, 2005, p.1)

International efforts to define vulnerability in a holistic manner have not been exempt from criticism, especially regarding the inclusion and attention paid to the social structural factors that shape vulnerability. The HFA and successor reports refer to them as 'underlying factors' or 'underlying drivers' (UNISDR, 2009b; 2011), in a certain way, diminishing their importance in the production of risks and causation of disasters. Wisner has fiercely criticised the 'real' inclusion of these structural factors within UNISDR works:

> "We have to convince UNISDR and, especially, UNISDR's financial supporters (some of whom are quite skeptical about UNISDR's performance) that [the Sendai Framework] has got to include these root causes and dynamic pressures among the currently bland and superficial list of "underlying risk factors" in HFA".
>
> (Ben Wisner, Mailing list communication RADIX, 24 September 2013)

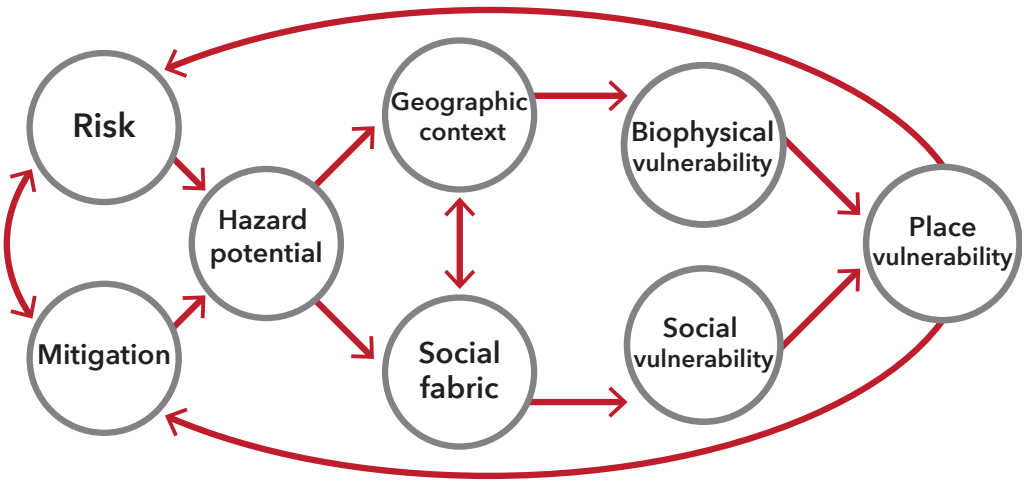
Although there is a general recognition that the socio-economic, political, and cultural factors are determinants in shaping vulnerability, such factors are generally minimised or simply taken out of risk assessments (Fekete et al., 2010). By the end of 2014, the HFA's description of vulnerability remains invariable as it was used during the entire process of the *Post-2015 Framework for Disaster Risk Reduction* (UNISDR, 2014b), and has even persisted as such in the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) signed in March 2015 (UNISDR, 2015b). The lack of advances to render root causes of vulnerability visible, as was strived for in previous decades, may displace its taxonomy to a less relevant position. As Cannon (2000) advised, the challenge of analysing a highly complex and dynamic phenomenon like 'vulnerability', alongside with its 'depolitisation' and assessments often in inadequate ways, would have swept the concept of vulnerability under the rug with other buzzwords like 'sustainability' and thereby run the risk of the term becoming meaningless. In this sense, by re-problematising the social production of vulnerability and risks, this thesis seeks to render the relevance of societal/structural factors visible by looking at how models of managing risks and disasters may contribute, counterintuitively, to (re)produce vulnerability, especially to make such factors visible to policy and decision makers as these play a critical role within the governance of disaster risks.

The next section situates the significance of the underlying causes of vulnerability and risks by illustrating how different approaches conceptualise 'vulnerability to disasters' in the form of 'biophysical' and 'social' vulnerability. These perspectives aim to support the analytical framework (outlined in section 3.5) as well as justify the selection of the analytical PAR model.

### 3.2.3 Vulnerability approaches

Birkmann (2006b) compiled different conceptual frameworks and definitions of vulnerability. In his analysis, Birkmann highlighted the need for a paradigm change, from the quantitative analysis of hazards to a combined qualitative/quantitative identification, ranking and assessment of vulnerabilities. One influential call for this paradigm change came from Susan Cutter (1993; 1996; Cutter et al., 2003). Cutter interrogated vulnerability in relation to environmental factors. The first distinction Cutter (1996, p.530) makes is that there is an inherent "individual vulnerability" as the potential for, or sensitivity to, losses or harm. "Social vulnerability", on the contrary, refers to the susceptibility of social groups to potential losses from extreme natural events. Cutter (1993) also asserted that another vulnerability emerges in the interaction of human-beings with environmental conditions which in turn "affects the resilience of the environment to respond to hazards" and alters the adaptation of communities to such changing conditions (Cutter, 1996, p.530). Cutter called this 'biophysical vulnerability'. In an attempt to integrate both approaches, Cutter (1996) developed the Hazards of Place Model of Vulnerability (see Figure 3.1).

**Figure 3.1. The Hazards of Place Model of Vulnerability**




*Source: Cutter (1996), adapted by the author (2017)*

In the Figure 3.1, Cutter emphasised vulnerability as the interaction of biophysical hazards and social responses within a specific geographical space. Cutter's model described that vulnerability always takes place in a specific spatial area or that it always has a specific geographical domain. In her own words:

> "The various elements that constitute vulnerability interact to produce the vulnerability of specific places and the people who live there. This vulnerability can change over time based on changes in the risks, mitigation and contexts within which environmental hazards occur".
>
> (Cutter, 1996, p.533)

Although the 'place vulnerability' model may be advantageous to interrogate the way in which physical and social factors of vulnerability interact to create an 'overall' vulnerability, this model does not focus on its 'underlying causes' or root causes: neither is suitable for the organisation of the production of vulnerability within a multi-scalar perspective. Cutter et al. (2000) recognised the significance of the economic, political, and cultural factors in society that shape disaster vulnerability, however she relied on the use of quantitative demographic indicators at local levels such as 'No. of non-white residents' and others to represent 'differential access to resources' or 'susceptibility to hazards due to physical weakness'. This approach may be beneficial for advancing the understanding on the complex interrelated physical and social factors at local levels, and perhaps to produce policy recommendations using quantitative data, but not necessarily useful for investigating the 'progression' of vulnerability from its origins to its materialisation in the form of unsafe conditions, and from a multi-scalar perspective as is intended in the case of Chaitén.

Alongside the debate on vulnerability to natural hazards initiated in the 1980s and the recognition that vulnerability plays a determinant role in the causation of disasters, vulnerability has also been approached in other ways. Beyond the social and environmental vulnerability discussed above, another set of studies have approached the concept of vulnerability within boundaries of physical or 'natural' sciences, and economics. For instance, during the 1980s and 1990s, researchers and

institutions such as Heyman et al. (1991) Gabor and Palenda (1982), and UNDRO (1979) focused on exposure and 'physical vulnerability' by studying the rapid outset of extreme events, their frequency, magnitude, impact, and duration. This group of studies also focused on the analysis of specific hazardous events –e.g. floods, volcano eruptions, earthquakes, and so forth–, their spatial distribution in relation to the population, and their potential for losses. In economics, institutions such as the International Monetary Fund (IMF) and the World Bank have promoted the study of 'financial and economic vulnerability' (GFDRR, 2012; Ghesquiere and Mahul, 2014; IMF, 2008; OECD et al., 2012; The World Bank, 2014) at different analysis units –states and urban levels–, thereby connecting them to poverty, climate change, and disaster risk (Laframboise and Loko, 2012). More recently, the Asian Disaster Preparedness Center (ADPC) has referred to 'cultural vulnerability' to assess the exposure subjected to cultural values and norms, and the potential loss of cultural assets such as monuments and temples (ADPC, 2014).

This brief outline of different trajectories of enquiry in vulnerability studies may reflect the intricate process of conceptualising vulnerability. However, what emerges among these attempts is the ultimate recognition that vulnerability is a complex dynamic process focused on the social, 'multi-dimensional and differential' –as it varies across space and among and within social groups–, and 'scale dependent' –as it depends on time, space and units of analysis such as individual, household, region or city (Vogel and O'Brien, 2004)– aspects. Hence, its assessment should not be reduced to merely 'physical' factors, but also to structural social, economic, political, and cultural ones (IFRC, 2014).

This perspective was captured by the well-known definition given by Wisner and his colleagues (2004), and perhaps one of the most widespread definitions of vulnerability in recent years. The book by Wisner et al. (2004) *At risk: Natural hazards, people's vulnerability and disasters*, in which vulnerability becomes a central concern, is commonly referenced in reports such as the IPCC's SREX (Field et al.,

2012) and UNISDR's Global Assessments Reports (GARs) (2009b; 2011; 2013; 2015a). This is also the definition adopted for the thesis:

> "The **characteristics** of a person or group and their **situation** that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard (an extreme natural event or process). It involves a combination of factors that determine the degree to which someone's life, livelihood, property and other assets are put at risk by a discrete and identifiable event (or series or 'cascade' of such events) in nature and in society".
>
> (Wisner et al., 2004, p.11; own emphasis)

This perspective offered by Wisner and his colleagues (2004) talks about 'internal' (characteristics) as well as 'external' factors (situations). But beyond this definition they explored, with much more intensity, the structural factors in economy and politics rather than the society-nature relation. Although this can be a matter of critique (Turner, Kasperson et al., 2003), Wisner et al. (2004) made great effort in dissecting disaster vulnerability from a social constructionist and political economy perspective. The next section further discusses it by stressing the social relations that produce vulnerability.

### 3.2.4 Structural factors and the social production of vulnerability

Cardona (2006) argued that risk is a socially constructed phenomenon based on the idea that social, economic, political, and cultural factors in conjunction with environmental problems act over time to produce and reproduce vulnerability in the form of unsafe conditions. However, vulnerability to disasters, as a process, does not reside exclusively within physically unsafe conditions (both geophysical and locational), but also exists in the various social, economic, political, and cultural processes that contribute as 'underlying causes' to its materialisation (Chardon, 1998; 2004; Chardon and Gonzalez, 2002). Wisner et al. (2004) contested the overemphasis on the 'naturalness' of disasters arguing that societal factors are constitutive elements in the production of vulnerability and disaster risks:

> "When disasters happen, people and media interpretation tend to focus on their "naturalness", as in the phrase "natural disaster". The natural hazards that trigger a disaster tend to appear overwhelming. [...] But crucially, humans are not equally able to access the resources and opportunities; nor are they equally exposed to the hazards. Whether or not people have enough land to farm, or adequate access to water, or a decent home, are determined by social factors (including economic and political processes). And these social processes also have a very significant role in determining who is most at risk from hazards: where people live and work, and in what kind of buildings, their level of hazard protection, preparedness, information, wealth and health have nothing to do with nature as such, but are attributes of society".
>
> (Wisner et al., 2004, p.6)

From this perspective, Wisner et al. (2004) modelled the political economy of disaster by underlining the importance of 'social relations' and 'structures of domination' within societies as they are the context where 'normal life' takes place, as well as being the place where vulnerability is produced. 'Social relations' and 'structures of domination' are two concepts introduced by Wisner et al. (2004) as part of the PAR model. According to the authors, the model is a political economy exploration of people's capacity to deal with the impact of hazards in terms of the level of access they have (or do not have) to the resources needed for their livelihoods before and after a hazard's impact. On the one hand, social relation "encompasses the flows of goods, money and surplus between different actors, for example, merchants, urban renters, capitalist producers of food, rural and urban households involved in various relations of production and endowed with a particular range and quality of access to resources" (Wisner et al., 2004, p.93). On the other hand, structures of domination "refer to the politics of relations between people at different levels. [...] These relations shape, and are shaped by, existing rights, obligations and expectations that exist within the household and which affect the allocation of work and rewards" (Wisner et al., 2004, p.94). Thus, both 'social relations' and 'structures of domination' may prove to be useful in exploring the context where 'root causes' and 'dynamic pressures' are produced and vulnerability advances until its materialisation. In this thesis, I explored these relations in the context of Chile and its possible effects on the model of disaster risk management:

the processes of political and economic centralisation, and its repercussions in the processes of policy responses to disasters and decision-making in the case of post-disaster Chaitén (see Figure 2.5 in page 53, Chapter Two).

The next section examines the PAR model in greater detail. This is deemed necessary as the model represents a suitable framework to interpret the process of production of vulnerability from a social constructionist and structural approach, and it enables the integration with a multi-scalar perspective adopted in this study. For this reason, the next section aims to integrate the recently described perspectives of vulnerability with the PAR model, as well as to introduce a multi-scalar perspective to interpret such a model and therewith the causation of disasters.

## 3.3 The PAR model and a scalar perspective

### 3.3.1 The PAR model explained

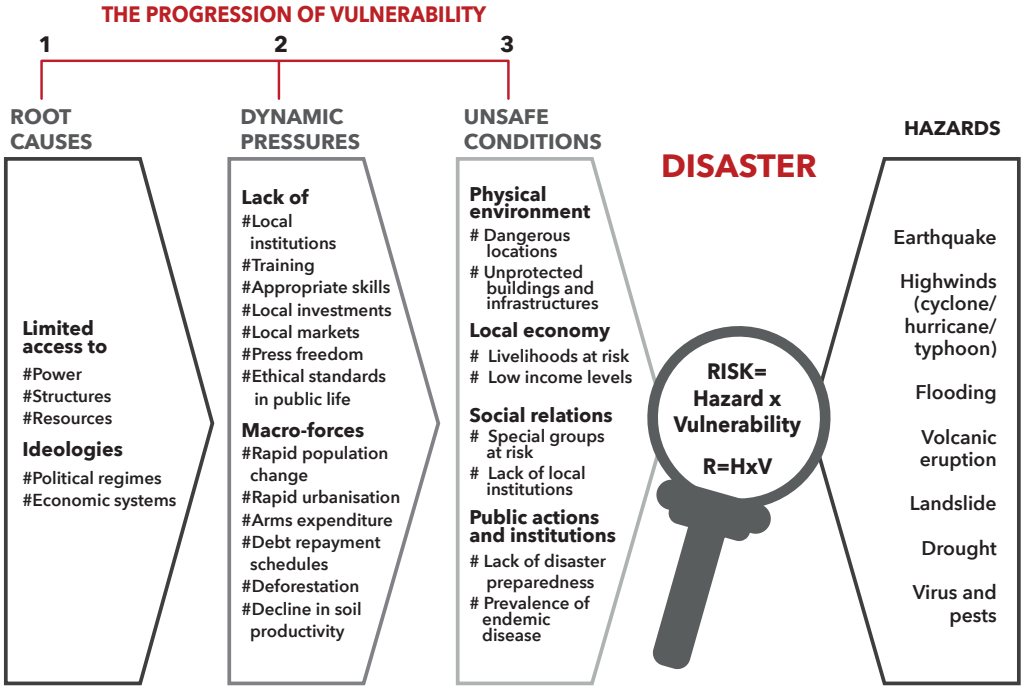
The disaster PAR model was first developed by Blaikie et al. in 1994 and refined later by Wisner et al. in 2004. Based on the conceptual equation 'hazard × vulnerability = risk → disaster', the PAR model seeks to explain vulnerability to disasters and its progression. By assuming natural rapid-onset extreme events as something that society has little control over, the PAR model presents vulnerability as a phenomenon strictly developed by means of social factors. The model innovates disaster studies and disaster sociology by 'unpacking' the concept of vulnerability to disasters, and then conceptualising 'the progression of vulnerability'. The representation of the model (see Figure 3.2) proposes that vulnerability's progression is organised through differentiated stages: from its 'root causes' and 'dynamic pressures' to 'unsafe conditions'. This idea advances disaster studies by suggesting that in order to prevent disasters and promote effective disaster risk reduction strategies, vulnerability must be necessarily reduced, and its 'root causes' addressed. This also implies that the reduction of vulnerability should then be at the core of policy goals for disaster risk management (DRM) and disaster risk reduction (DRR) –though without neglecting the likelihood of natural hazards occurring, their magnitude, as well as their intensity in specific social, cultural, economic and

political contexts (Aragón-Durand, 2007; Wisner et al., 2004). Additionally, structural factors in society –e.g. 'social relations' and 'structures of domination'– need to be revisited and addressed within effective disaster risk discussions at all levels, including but not restricted to policy and decision-making mechanisms, inclusion of civil society and grass root organisations, gender relations, models of territorial organisation, among others (Wisner et al., 2004). A close examination of these structural factors could explain why and how men and women become affected by and are vulnerable to specific hazards. For instance, Aragón-Durand (2007) used a socio-historical analysis of disasters to underline the importance of taking into consideration particular social actors and institutions in hazard generation and flood vulnerability over time in Mexico City's south-eastern peri-urban interface. He asserted that chronic flooding in that area is the result of a complex interaction between inadequate urbanisation policies, permanent ecological deterioration and ground subsidence, poor sanitation and short-term policy responses to past and present disasters.

In Figure 3.2, this progression is organised by means of tracing the nature of 'root causes' of vulnerability and disasters: the way in which vulnerability's origins can be traced from local 'unsafe conditions' such as living in disaster-prone areas, through economic and social 'dynamic pressures' such as corruption, all the way to the 'root causes' such as economic models, ideologies, and the like. For Wisner et al. (2004), vulnerability is socially, economically and politically rooted and, when combined with physical processes such as earthquakes and volcanic hazards, it may produce risk, and when confronted with the occurrence of an extreme event, disasters. In the words of the authors:

> "[The PAR model] is introduced as an analytical tool for showing how disasters occur when natural hazards affect vulnerable people. Their vulnerability is rooted in **social processes** and **underlying causes** which may ultimately be quite **remote** from the disaster event itself. The basis for the PAR idea is that a disaster is the intersection of two opposing forces: those processes generating vulnerability on one side, and the natural hazard event (or sometimes a slowly unfolding natural process) on the other".
>
> (Wisner et al., 2004, p.50; own emphasis)

**Figure 3.2. The disaster Pressure and Release (PAR) model**




*Source: Wisner et al. (2004), adapted by the author (2017)*

In the PAR model, vulnerability is explained through three arrays of linkages: root causes, dynamic pressures, and unsafe conditions. The most distant of these linkages are the 'root causes'. Root causes are understood as "an interrelated set of widespread and general processes within a society and the world economy" (Wisner et al., 2004, p.52): examples may include political regimes or economic crises, unforeseen effects of long-term public policies, among others. Root causes are thus the social, economic, cultural, historical, political, and ideological processes embedded into and structured from society, and are importantly linked with the function of the state, and reflect the exercise and distribution of power in a society. According to Wisner et al. (2004, p.53), "people who are economically marginal – such as urban squatters– or who live in an environmentally 'marginal' ecosystem – flood-prone urban locations– are also of marginal importance to those who hold economic and political power".

Besides the root causes, 'dynamic pressures' are understood as processes and actions that translate the effects of root causes both temporally and spatially into particular and place-specific 'unsafe conditions'. These may include, for instance, structural adjustment policies implemented during a specific period –e.g. decentralisation policies–, rapid urbanisation on the outskirts of cities, and rural-urban migration in response to the economic and social inequalities inherent in root causes. Likewise, unsafe conditions are understood here as "the specific forms in which the vulnerability of a population is expressed in time and space in conjunction with a hazard" (Wisner et al., 2004, p.55). In this sense, men and women with limited opportunities may find themselves 'forced' to live in hazardous locations with insufficient protection by the state and institutions, thereby being unable to afford safe buildings or conversely having entitlements that are nonetheless prone to rapid and severe disruption. 'Unsafe conditions' are also determined by the initial level of people's well-being and their access to tangible –e.g. cash, shelter, food stocks, agricultural equipment– and intangible resources such as networks of support, knowledge on survival, and sources of assistance, morale, and the ability to function in a crisis (Cannon, 2000; Wisner et al., 2004).

Although I have explained that the PAR model offers an advantageous analytical perspective to look at vulnerability, it is also, however, subject to a number of inadequacies. This deep interrogation on the societal/structural factors of vulnerability may obscure another important and equally determinant relation within disaster causation: the environment. The environment also forms part of the social framework that can and often does shape hazards and risks (Turner, Matson, et al., 2003). There is much evidence in the use of natural resources for economic activities, and the environmental problems and hazards associated with them. We know that certain hazards are intertwined with societal systems affecting livelihoods and assets such as land distribution and ownership after floods (Wisner et al., 2004). Nevertheless, the environmental-human relation in the case of post-disaster Chaitén does not seem to be present compared to the social factors –policy responses and the model of governing disasters and risks– which better explain the vulnerability in

Chaitén. This overemphasis on the structural factors of vulnerability is also present in the 'rivalry' between the SP and MP mentioned earlier, and of course is present in the limitations of the thesis. From this perspective, in my opinion, the PAR model sacrifices amplitude but gain in focus in untangling the social causes of disaster vulnerability. And by using this model in the case of Chaitén, the thesis yields a holistic understanding in empirical terms, as it concentrates the analysis of policy responses to disasters and the model of DRM in Chile.

Thus, the conceptualisation of vulnerability proposed in the PAR model implicitly expands the idea of vulnerability towards processes and circumstances —root causes, dynamic pressures, and unsafe conditions, named in the model— that are both temporally and spatially remote from the affected area. This 'distancing' of the causes of vulnerability and disaster risks lies at the centre of this thesis' inquiry and specifically: How have policy responses to disasters influenced the progression of disaster vulnerability, at different scales, in post-disaster Chaitén? The next section, trying to answer this question, articulates how a multi-scalar perspective may contribute to a better understanding of such progression.

### 3.3.2 The multi-scalar progression of vulnerability

The idea that disaster risk and vulnerability may be progressively accumulated by socio-economic and political factors within minor geographical areas —e.g. city, community, and other sub-regional or sub-national levels— is implicit within the analysis of the PAR model. The PAR model represents causality and progressiveness when it conceptualises vulnerability: 'unsafe conditions' are caused by 'dynamic pressures' which, in turn, are produced by 'root causes'. Through all these phases, vulnerability is produced, reproduced or perpetuated by the social 'system' at different levels. It can be interpreted then that 'root causes' are nested in major geographical scales such as global or national, while 'dynamic pressures' operate between major and minor scales, and 'unsafe conditions' are materialised at urban and local scales. Wisner et al. (2004) suggested that 'unsafe conditions' are the most evident expressions of vulnerability: these may include a poorly built environment,

and lack of response mechanisms and coping capacities, among other conditions. On the one hand, unsafe conditions are often the easiest to identify and assess because they are somehow 'materialised' and observable. While on the other hand, it is more difficult to establish strong or evident connections between vulnerable conditions and 'dynamic pressures' because the latter represent widespread processes such as structural adjustment policies implemented during a certain period, rapid urbanisation, rural-urban migration, poverty, lack of building codes or poor construction supervision, and corruption (Wisner et al., 2004). These widespread processes, either acting as root causes or dynamic pressures, seem to be nested and organised at global, national and regional scales, as these often interrelate and exist in extra-national and national scales (Pelling, 2003a).

For Wisner et al. (2004), root causes and dynamic pressures can be 'distant' from an affected area in three different senses:

> "[Root causes and dynamic pressures] are distant in one, two or all of the following senses: spatially distant (arising in a distant centre of economic or political power), temporally distant (in past history), and finally, distant in the sense of being so profoundly bound up with cultural assumptions, ideology, beliefs and social relations in the actual lived experience of the people concerned that they are 'invisible' and 'taken for granted'".
>
> (Wisner et al., 2004, p.52)

Considering this, I suggest that the root causes and dynamic pressures that have produced and materialised vulnerability in Chaitén are distant from the city in, at least, two senses: spatially and temporally. Although the case of post-disaster Chaitén will be described and analysed in greater detail during the case study in Chapter Four and Chapter Five, I assumed that the PAR model frames the question of the progression of vulnerability in post-disaster Chaitén within a 'scale question', that is to say, how do policy responses to disasters unfold the progression of disaster vulnerability through differentiated scales? I propose that this question may be answered by examining how policy responses and decision-making in the post-disaster context of Chaitén were organised at different geographical scales –i.e. nationally, regionally, and locally– to ultimately enable the materialisation of

vulnerability in the form of 'unsafe conditions'. This is done all whilst considering that 'root causes', 'dynamic pressures', and 'unsafe conditions' are embedded into an already existent scalar structure of territorial governance for the case of Chile. The methodological approach to address this scalar structure in Chile is clarified in the following section.

Coming back to the PAR model, it may be said that the model implicitly describes the progression of vulnerability as a multi-scalar phenomenon: 'unsafe conditions' often are evident at local or urban scales, 'root causes' and 'dynamic pressures' are articulated within processes that operate at major geographical scales: regional, national, and global. A strategy to interpret the progression of vulnerability with a multi-scalar perspective lies in a subsidiary question: How are policy responses and governance of DRM and DRR in Chile organised and distributed from national to local level? This question adopts the idea that causes and drivers of disaster vulnerability in a post-disaster context –e.g. policy responses and decision-making– are organised in a geographical and scalar manner (Brenner, 2009a), from major to minor geographical scales. Hence, by understanding the scalar organisation of specific causes and drivers, I think it is possible to organise the progression of vulnerability using a multi-scalar perspective. But perhaps more importantly, the question is how these scalar relations were established and how these relations affect the model of DRM and policy responses to disasters for the case of Chaitén. These questions reveal another central aspect of this thesis that is useful to complete the analytical framework: geographical scales need to be understood as historically and socially mediated process (Marston, 2000).

The concept of geographical scales from a social constructionist approach, similar to understanding the progression of vulnerability and risks, is a central element of this work. At the end of section 3.2.1 in this chapter (page 83-84), I quoted Quarantelli to point out the significance of using social science perspectives and techniques in researching vulnerability as social phenomenon, including definitions of space and scales. The following section introduces the reader to the social construction of scales.

### 3.3.3 The social construction of scales

In approaching the 'progression of vulnerability' from a perspective of scales, it becomes crucial to understand how a geographical scale is produced and how its configuration –the relation between differentiated scales: e.g. global, national, regional, and local– may facilitate such progression from major to minor scales. I initiate this section by situating the idea of 'geographical scales' within a social constructionist approach.

Discussed primarily by geographers and physicists, 'geographical scale' has traditionally been conceived as fixed spatial units where social, economic, political and even environmental dynamics simply unfold (Brenner, 2009a). Geographical scales were understood just "as a fixed, bounded, self-enclosed and pregiven [spatial] containers" (Brenner, 2001, p.592). Soja (1989, p.149) noted that the "question of scale" and its social production remained "understudied" and was "generally subordinate to analyses of spatial practices positioned within fixed geographical scales: the local, the urban, the regional, the national, and/or the global" (Brenner, 1998, p.460). This traditional view was adopted during contemporary transformations such as the massive geographical changes entailed by globalisation: the global labour market restructuring in the 1970s (Castells, 1989; Sassen, 1991), the crisis of the nation-state's territoriality (Appadurai, 1996; Liubimau, 2011), and the reterritorialisation process of cities and states during the 1990s and 2000s (Brenner, 1999). Such transformations demonstrated that certain social phenomena unfold not only at one single spatial scale –e.g. urban 'or' global– but also at multiple geographical scales simultaneously –e.g. urban, regional 'and' global. Brenner (1998, p.463) referred to these phenomena as "multi-scalar processes". Accordingly, Brenner proposed a fundamental change in understanding geographical scales, saying that these should not be grasped individually, but instead as a result of multi-scalar processes and therefore as interconnected and interdependent spatial entities:

> "Scales can only be grasped **relationally**. Scales cannot be construed adequately as fixed units within a system of nested territorial containers defined by absolute geographic size (a 'Russian dolls' model of scale). The institutional configuration, function(s), histories, and dynamics of any one geographical scale can only be grasped relationally, in terms of its upwards, downwards, and transversal links to other geographical scales... [...] From this point of view, it is analytically imprecise to speak of scale in singular terms as, for instance, in discourses about 'the' urban, 'the' regional, 'the' national, or 'the' global. Such substantialist formulations misleadingly imply that individual scales contain a coherence in and of themselves, and thus bypass the essential task of analyzing their relational co-constitution in and through multiscalar structuration processes".
>
> (Brenner, 2009a, p.72; own emphasis)

In relation to the above, Doreen Massey's famous (1994, p.63) question, "in what sense are 'regional' problems regional problems?" and the well-known concept "glocalization" developed by Swyngedouw (1992) both prove themselves useful when applied to illustrate Brenner's idea (2009a). The idea here is that when we analyse the progression of vulnerability through different geographical scales, these need to be grasped 'relationally' as well as the causes and drivers that compose the 'vulnerability process': "the values, ideas, behaviours, and actions that have led to characteristics such as fragility, weakness, exposure, and susceptibility and that could perpetuate or absolve these issues" (Kelman et al., 2016, p.136). In the same line, I argue with this thesis that disaster vulnerability and its production should no longer only be associated with local factors but rather always with a multiplicity of actors and processes acting at different and interrelated scales. Then, root causes, dynamic pressures, and unsafe conditions can be organised in vertical and horizontal arrangements.

The idea of geographical scales as social constructions, in addition to Brenner's observations, has emerged from and has been supported by other critical thinkers[8]

[8] This concept is devised within the critical theory. Critical theory here refers to the neo-Marxist reflexion –critical thinking methods– of the Frankfurt School developed in the late 1930s . In contrast to 'traditional' theory which aims to the solely understanding or explaining of society, critical theory can be understood as a social theory associated with the critique and change of society as a whole (Horkheimer, 1937).

such as Swyngedouw (1992), Smith (1984; 1993), and Knox (1995). For them, geographical scales, as social space, were undoubtedly socially constructed as social processes need space to delineate their practice and struggle (Lefebvre 1991 [1974]). In that process, geographical configurations emerge, that is, "a set of interacting and nested scales (the '*gestalt* of scale')" (Swyngedouw, 1997, p.169), often composed of local, urban, regional, national, international, and global spaces. The resulting scalar configuration is temporary and in perpetual transformation over time, depending on the extension and contraction of the socio-spatial struggle itself (Marston, 2000; Swyngedouw, 1997). As reflected by Swyngedouw (1992, p.60), "geographical scale is both the realm and the outcome of the social struggle over control over space". Accordingly, Brenner (2001) concluded, geographical scales are "malleable" and "historically changeable" as their production is subordinated to socio-political contestation in history (Brenner, 2001, p.599). One only need look at for instance how geo-political boundaries have been transformed throughout human history, or how 'global' and 'national' scales have contracted since the rise of ever faster transport networks and communication technologies (Castells, 1996). This historical perspective is interesting and particularly useful for this thesis. Then, a historical analysis of processes that are presumably connected with the production of disaster vulnerability in Chaitén, are required to better understand how root causes, dynamic pressures, and unsafe conditions are arranged within the scalar configuration in Chile.

To initiate a scalar analysis, Brenner argued that geographical scales are better grasped as "differentiated spaces" often by size but, more importantly, scales as the result of a "vertical differentiation" (Brenner, 2009a, p. 71). Thus, what makes sense to one geographical scale category –e.g. urban– is its relation with other categories –e.g. regional, national, global. In other words, the socio-spatial analysis of urban, regional or national social phenomena should not be dissociated from a scalar differentiation analysis –"the hierarchical ordering or spatial hierarchisation of social formations" (Brenner, 2009a, p. 71). The inter-scalar or multi-scalar relationships between those classical spatial-scale categories –the global, the national, the

regional and the urban– should always be analytically considered. In that sense, this thesis is an attempt to consider these 'multi-scalar relations' in the progression of vulnerability. Crucial aspects of the socio-spatial analysis of scales such as 'historical changes' and 'hierarchical differentiations' should then be incorporated into the analysis of vulnerability and risks, as they allow for a deeper comprehension of the underlying factors that produce, reproduce, and perpetuate risks. I consider that this view is particularly advantageous when combined with the PAR model, as specific processes or circumstances –such as the model of DRM and policy responses to disasters in Chaitén– can be explored differentially and relationally.

Brenner proposed three analytical elements or 'propositions' to interpret scales from a social constructionist approach:

- Scales result from vertical differentiation
- Scales 'exist' because social processes are scaled
- Scales can only be grasped relationally

In the section below, these three elements are explained and connected with the PAR model and the analytical framework. They have been useful for interpreting the scalar relations that already exist within Chile in regard to the model of disaster and risk management, and policy responses.

*Scales result from vertical differentiation*

According to Brenner (2009a), the differentiation of social relations by scales occurs due to the 'vertical ordering' or spatial hierarchisation of social formations. Besides the 'horizontal' or territorial differentiation of social practices across space, there is also a 'vertical' differentiation in which social relations are hierarchically organised among global, extra-national, national, regional, metropolitan, and/or local levels. Although Brenner (2009a, p.71) asserted that the "spatialities" of scale, its physical manifestations, cannot be understood only in terms of this "verticality" or hierarchical relation, he strongly claimed that this feature is the *"differentia specifica"* of scalar configurations.

Regarding this thesis, one research purpose was to understand how policy responses to disasters and governance of DRM and DRR are organised at different geographical scales in Chile and why. This question looks at the 'scalar differentiation' in Chile in terms of how social relations and practices in the country have historically configured its territory. The resulting scalar configuration of the state, addressed in Chapter Four, will support the multi-scalar analysis of the causes and drivers of vulnerability in Chaitén.

*Scales 'exist' because social processes are scaled*

Brenner (2009a) pointed out that geographical scales exist because social processes themselves are scaled. Although the terms such as local, urban, regional, and so forth are used to demarcate apparently territorial "islands of social relations", they obfuscate the relational nature of social processes and the tangled multi-scalar networks through which the latter is constituted (Brenner, 2009a, p.69). The processes that shape geographical scales are socially based, and result from socio-economic, socio-environmental, political and cultural forces. Such processes are geographically scaled, that is, spatially organised, hierarchically differentiated, and historically changeable (Brenner, 1998; 1999; 2001). In the context of Chile, the process through which the country reached its current, yet 'transitory', scalar configuration is analysed from the history of the state territorial organisation, particularly through processes of administrative de- and centralisation. The historical processes of political and economic centralisation of Chile (see section 4.2 in Chapter Four) were interesting to the scalar analysis of the Chilean model of disaster risk management, as they helped to explain why the model is top-down and reactive oriented.

*Scales can only be grasped relationally*

According to Brenner (2000; 2009a), social relations are spatially demarcated through the creation of specific institutional configurations –e.g. regional governments and municipal councils. The resultant spatial 'unit' –e.g. urban, nation, local– of the social relations indicates the function and dynamic of a given

geographical scale but it can be only grasped relationally, that is: "in terms of its upwards, downwards, and transversal links to other geographical scales situated within the broader multi-scalar configuration in which it is embedded" (Brenner, 2009a, p.72). Single scales do not contain a coherence in and of themselves, so the processes of co-constitution in and through multi-scalar structuration processes with a historical perspective should always be considered in socio-spatial analysis of scales (Brenner, 2009a).

Furthermore, the relevance of a given geographical scale may differ qualitatively from the others depending on the aspects of the social processes which are being investigated –such as in the case of vulnerability. However, there will be always inter- and multi-scalar relations between all of these geographical scales. Each spatially-based social phenomenon and its scalar differentiation should be understood differently, and incidentally, "each scale needs to be understood in terms of its relation to other scales" (Mahon and Keil, 2009, p.8).

Hence, summing up Brenner's propositions, geographical scales are social constructions because the process that constitutes them is intrinsically intertwined with social ones: politically, economically, culturally, and the history that comes with it. Geographical scales are temporal crystallisations of 'vertical differentiation' of social relations and struggles. Then, a more precise analysis of scales will require us to look at the scales relationally, in terms of its upwards, downwards, and transversal linkages with other scales.

The following section offers some insights to address the processes of policy responses to disasters and model of DRM and DRR in Chile from the perspective of disaster governance and vulnerability.

## 3.4 Disaster governance, policy responses and vulnerability

During the multi-scalar analysis of the case of post-disaster Chaitén, through the PAR model, I inevitably encountered governance structures that participated in the production of vulnerability in Chaitén. The model of managing disasters and reducing risks in Chile and policy responses are undoubtedly framed within 'disaster governance'.

With the concept of disaster governance, I refer to the complex set of interrelated regulatory frameworks and norms, organisations, institutions, actors, and practices within the disaster cycle –i.e. disaster response, recovery, reconstruction, mitigation, and preparedness– that are organised at multiple social and geographical scales to anticipate, cope with, resist and recover from the impact of a natural or human-made hazard (Gall et al., 2014; Tierney, 2012). Disaster governance encompasses a multiplicity of organisational and institutional actors from formal governments, private companies, and civil society bodies, to informal organisations such as networks and elites. The relationships between sets of rules, actors, and organisations can be configured in horizontal and vertical governance arrangements. For Renn (2008), the horizontal arrangements capture the relevant set of actors, rules, and organisations within a defined spatial or functional segment, such as the actors within a community, city, or nation. Instead, vertical arrangements consider the hierarchical relations among the elements of a given segment, as well as the peculiarities of such linkages. Disaster governance may have an important influence on the production and prevention of the growth of vulnerability, and ultimately for the reduction of disaster risks (UNDP, 2015). Whilst disaster governance on the one hand refers to the complexity of multiple elements that are relevant within the never-ending disaster cycle, socio-ecological and political economy perspectives tell us that such a 'web' of disaster governance can explain both the production and reduction of vulnerability, risks, and disasters on the other.

This perspective of disaster governance is utilised in Chapter Four to analyse and organise, in a multi-scalar manner, some specific drivers of disaster vulnerability in

Chile –e.g. how the National Emergency Office (ONEMI), for instance, is hierarchically organised.

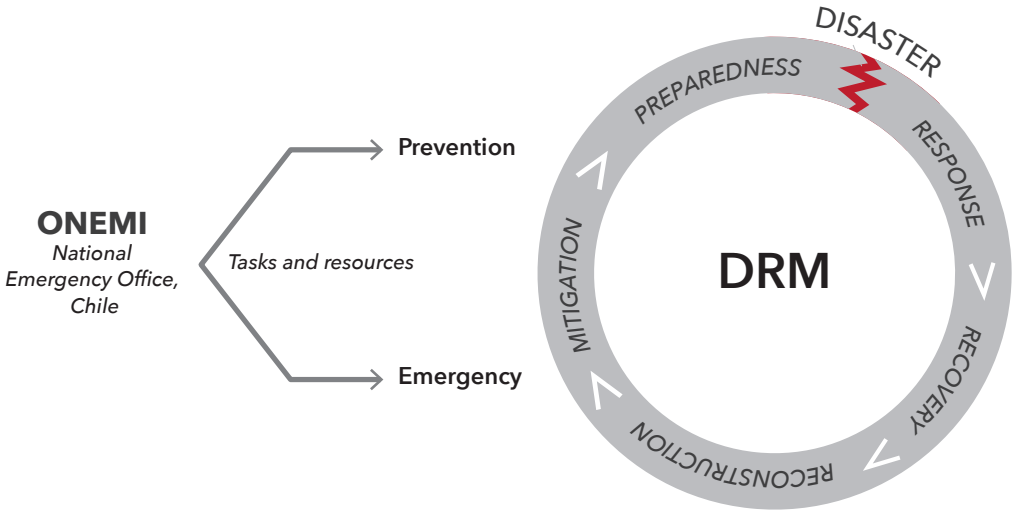
As I elaborated earlier, disaster governance has implications for the progression of vulnerability. For instance, when viewing the historical evolution of the state territorial organisation and governance of Chile –i.e. from federalist to centralising models (Montecinos, 2005)– we can observe how this, as a 'root cause' process, has enabled and facilitated the centralisation of decision-making within the domains of DRM and DRR. I utilise the idea of disaster governance to comprehend and to offer some coherence within the multiplicity of actors, rules, and processes related to DRM on different geographical scales for the case of post-disaster Chaitén.

Another concept used during the analysis of the case study is 'policy responses to disasters'. Although there is a wide range of possible definitions, I prefer to use the idea of Ward et al. (2016) which considers policy response as "a dialogue between policy makers, who devise targets and programmes, and policy implementers, who respond by putting these plans into action" (Ward et al., 2016, p.46). That 'dialogue' occurred in the case of Chaitén starting from the volcanic eruption when emergency response and recovery mechanisms were activated by the government, until end-2014 when most strategies and mechanisms were gradually halted. Four fundamental processes are considered policy responses in the Chaitén disaster: evacuation, recovery and compensation, relocation, and reconstruction. Policy responses to the Chaitén disaster involved actors at major levels such as the Congress and the national government, but also policy implementers such as the Municipality of Chaitén and the ONEMI, among others. Although during the analysis of the case study, I do not analyse the total disaster governance in Chile (for obvious reasons), I do look at the model of DRM and DRR and specific policy responses and decision-making.

The concepts of 'disaster risk management' and 'disaster risk reduction' are of central concern in this thesis too. Although there are various definitions in the technical literature (see for instance in UNISDR, 2009a), DRR is broadly understood to mean "the development and application of policies, strategies and practices to

reduce vulnerabilities and disaster risks throughout society" (Twigg, 2015, p.6). DRM is often used in the same context, referring to a systematic process of using "administrative directives, organisations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster" (UNISDR, 2009a, p.10). DRM is more focused on the operationalisation of initiatives to achieve DRR goals, but there is some overlap between the two terms and in practice they are sometimes used quite loosely or flexibly, with very similar meanings (Twigg, 2015). In Figure 3.3, and throughout the thesis, the term 'model of DRM and DRR' refers to a system of related concepts and processes that represent a particular mode of dealing with the reduction and management of risks and disasters. It describes a very broad-based approach to the causes of disasters and dealing with their consequences. The idea of 'model' is applied in the broader sense to represent governance, policy, strategic, institutional, operational configurations within a national system, including in particular, but not restricted to policy responses to disaster and decision-making. In the figure below it is possible to observe the DRM and DRR model developed by the ONEMI (2016), which is based on the 'disaster cycle', a conceptual model that is still used by many emergency management and civil protection organisations (Twigg, 2015).

**Figure 3.3. The general model of DRM in Chile with the ONEMI**




*Source: elaborated by the author (2017), based on ONEMI (2016)*

This is a linear-cyclical operational model, dividing the cycle into phases –before, during and after disaster–, each of which requires different forms of intervention – mitigation, preparedness, response and recovery. The formulation is quite popular perhaps because it is easy to grasp and use for DRM actors to allocate tasks and resources. However, it does not capture the complexity of disasters. As we have discussed in previous sections, root causes and dynamic pressures of risks and disasters can be distant and entangled in a complex web of actors and processes at different scales, and in history. Thus, the DRM cycle does not capture such complexity, rather just compartmentalises it. DRM models, which are largely derived from business and organisational management thinking (Oliver-Smith and Hoffman, 1999), provide a useful perspective on how to approach disasters and reduce risks in a constantly repeating process of hazard and risk identification, analysis and mitigation that incorporates feedback and learning, however, this also can lead to fragmented efforts to reduce risks and disasters (Twigg 2015).

## 3.5 Analytical framework

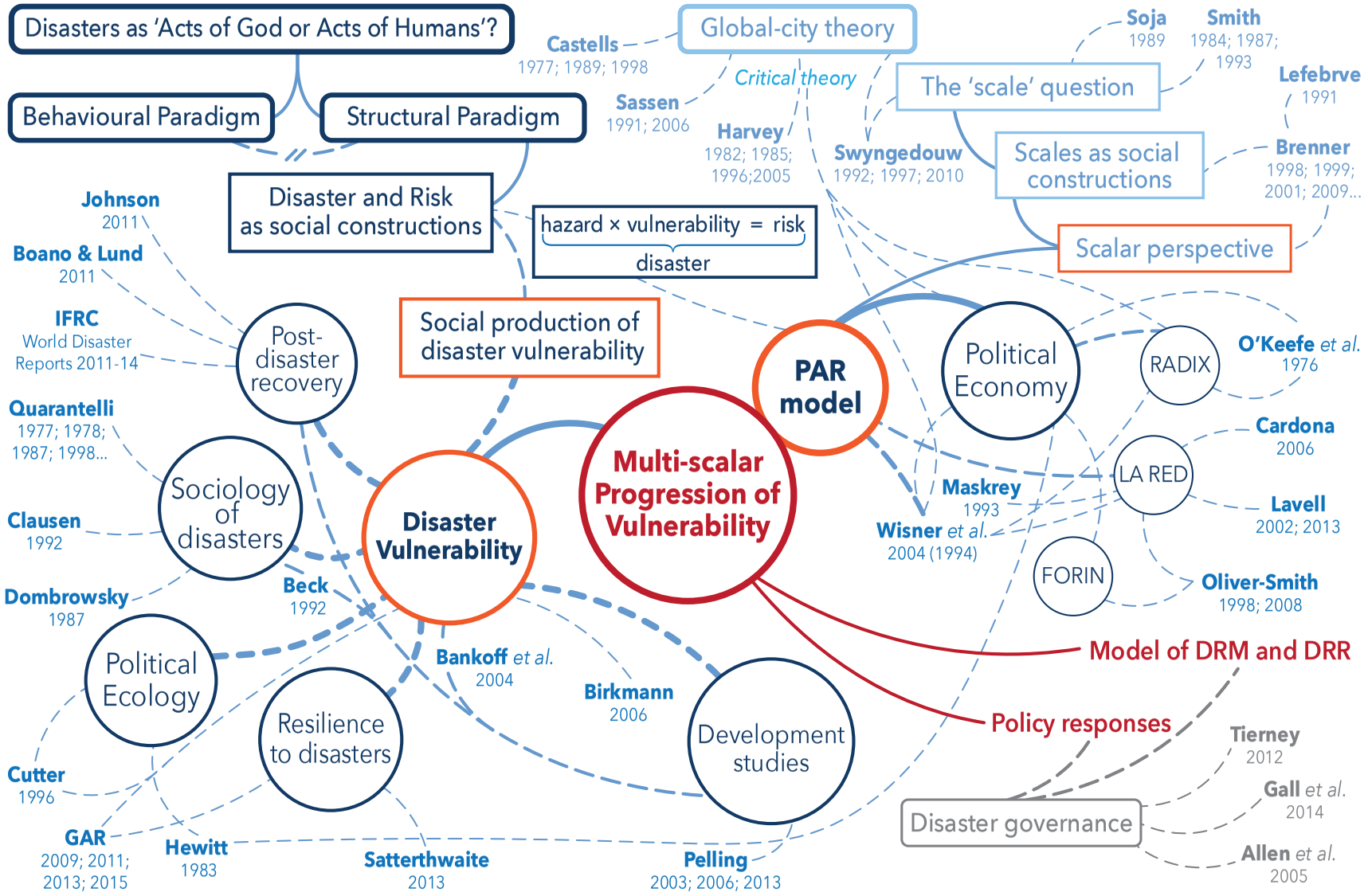
All the previous parts of this chapter were discursively presenting the analytical elements of the study. The purpose of this section is to sum up the analytical framework by outlining the principal analytical elements discussed so far.

The figure below offers a map of the literature review that includes authors, groups of researchers and 'think tanks', and methodological elements that inform the analytical framework. It is important to note here that not all the literature I reviewed is necessarily included in this chapter due to matters of space and scope, and to make the argument more fluid for the readers. Nevertheless, some extra authors are presented in the figure below as a matter of 'accountability' as their contributions informed and influenced certain elements and ideas within the framework.

In Figure 3.4, there are two relevant bodies of knowledge selected for the study – i.e. disasters (dark blue) and scale (light blue) literature–, and how these combine within the proposed 'multi-scalar progression of vulnerability' –at the centre in red. Case-based elements are also included in the figure, in grey.

The linkages between the elements represent direct (solid line) or partial (dashed line) influences that inform particular or various analytical elements. For instance, I suggest that 'critical theory' (top centre) may have influenced the 'political economy' perspective within disaster studies –which in turn influences the rationale behind the 'PAR model'– through authors such as Wisner et al. (2004) and the group RADIX. Also shown is how the 'PAR model' has contributed to the development of the concept of 'vulnerability' within the so-called 'theory of disasters' (elements in blue colour). Figure 3.4 also tries to illustrate what I think is the development of the 'scale question' within the global-city literature (light blue) alongside influential authors –e.g. Brenner, Smith, and Swyngedouw–, and it illustrates how the 'scale question' is positioned in relation to the 'PAR model' as a 'scalar perspective'. Thus, the centre of the diagram is the 'multi-scalar progression of vulnerability' which is the main contribution to the study of disaster vulnerability and vis-à-vis Chile. This receives inputs from the 'PAR model' and a 'scalar perspective' on the one hand, and from the model of governing disasters and risks on the other.

Figure 3.4. Mapping literature review, framing the analysis




*Elaborated by the author (2017)*

In sum, the analytical framework is comprised of several fundamental elements. Starting from the most elemental, this study is grounded within the SP, that is, a perspective that looks at the structural factors –i.e. economic, political, cultural– in society such as 'social relations' and 'structures of domination' as constitutive elements of disasters and risks (Bankoff et al., 2006; Wisner et al., 2004). SP advocates for tackling underlying (social) causes of disaster vulnerability as fundamental ways to effectively reduce disaster risks. This departing point is fundamental to position the argument –as well as the limitations– of the thesis. A second analytical element is the idea that disasters and risks are social constructions. Here disasters and risks are seen more and more as the result of an imbalance between social and environmental factors, where vulnerability plays a major and determinant role. This is precisely one of the crucial analytical elements within the framework (in red): the social production of disaster vulnerability. The latter has led to the discussion of other fundamental questions around the role of politics, economy, governance, and culture in the production and prevention of growth of vulnerability. Within this set of questions, the PAR model has been advantageous to examine the relations between societal causal factors of vulnerability and the occurrence of disasters: the progression of vulnerability, root causes, dynamic pressures, and unsafe conditions. This perspective is complemented later with a scalar perspective –grounded in the global-city theory– which allows for organising causes and drivers of vulnerability in relation to the scalar configuration of the Chilean state. Such scalar configuration is investigated in the case of Chile but in particular to the case of post-disaster Chaitén. The model of DRM and DRR, and policy responses to disasters –but also disaster governance– are examined in both directions, from their *praxis* in the post-disaster in Chaitén, to their histories and processes that have constituted them.

Overall, the framework aims to present the theoretical and methodological context where the thesis builds on, assisting and informing the research process. This analytical framework also aims to assist and inform the principal objective of the thesis: re-problematise the progression of disaster vulnerability and risk from a

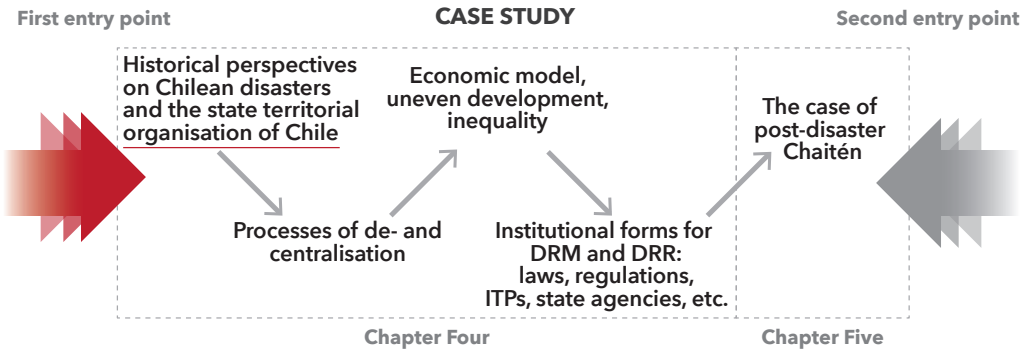
scalar perspective by examining how the social construction of disasters and policy responses to them are articulated at different inter– and hierarchically connected scales. The next two chapters are dedicated to analyse the context of Chile in relation to the DRM and DRR models, including policy responses to disasters, and the case of post-disaster Chaitén in particular.

# Chapter FOUR: The disaster policy context in Chile
## Contextualising Chile

### Introduction

This chapter and the following Chapter Five explore and analyse the case study. Because the research process moves between the national and local scale of post-disaster Chaitén, I consider it fundamental that the context of Chile is considered first, as it works to contextualise the policy responses and decisions made by national, regional and local governments during and after the Chaitén disaster. Hence, this chapter seeks to introduce the historic, institutional and territorial context of Chile, along with its models of disaster risk management (DRM) and disaster risk reduction (DRR), policy responses to disasters, and disaster governance. This is done mainly through the analysis of documentary sources. Figure 4.1 below explains that the case study is addressed from two different entry points. This chapter offers an historical perspective, so representing the first entry point. The idea here is to advance historical views on disasters in Chile and the territorial structure of the state, comparing this with the current model of DRM and DRR, including their relationships and implications.

**Figure 4.1. Rationale for the chapter case study's entry point**




In the previous chapters, I introduced the theoretical background of the thesis, the literature review and the methodology of research, before finally outlining the analytical framework. The latter defined the studied phenomenon –i.e. disaster

vulnerability– from a social constructionist approach, and it introduced the Pressure and Release (PAR) model to underpin the re-problematisation of the progression of vulnerability and risk from a scalar perspective. Such a perspective requires us to look at how social relations in a given society are articulated, organised and distributed in different geographical spaces, particularly those that can be connected to the production and progression of vulnerability. In this chapter, such relations are investigated to contextualise Chile, as they are seen as fundamental in understanding post-disaster Chaitén. The model of DRM and DRR –that is, a particular mode of dealing with the reduction and management of risks and disasters– is examined in two constitutive directions: the *praxis* of policy responses to disasters in Chaitén, and the different processes that produced it. The latter compel us to look back at certain events in the past that may have produced or influenced the model of governing disasters. This is the departing point of this part of the study.

## 4.1 A brief history of Chilean disasters

In this section I review existing narratives on the history of Chilean disasters in order to propose an initial understanding of the constitution and development of the Chilean disaster management approach.

The history of Chilean disasters is often positively highlighted by politicians, researchers, journalists and historians (El Mercurio, 2015; Pardo, 2017). After the 8.8 magnitude earthquake occurred in the Maule Region in 2010, the most disastrous event in the recent history of the country, the media and politicians underlined the performance of institutions and society in terms of their resistance to the force of nature and their capacity to resist and recover from disasters (American Red Cross Multidisciplinary Team et al., 2011; Galilea, 2013; Kaufmann, 2010; López Tagle and Santana Nazarit, 2011; MAE Center et al., 2010). Despite this, the evidence of important deficiencies in terms of the disaster management that created an uneven distribution of disaster impacts in Chile is often ignored: nor are the root causes of such deficiencies questioned by the media and politicians. Some deficiencies are

noted in relation to: inadequate coordination of emergency and recovery response (Navia, 2010), especially in effected remote localities (MAE Center et al., 2010); the weak and late response of the government to the *tsunami* alarm in 2010 –a decision that cost the lives of 156 men and women (Kaufmann, 2010)– and; the resilience of transport and communication systems –"the earthquake caused a blackout that affected 93 per cent of the entire population and lasted for several days in some locations" (MAE Center et al., 2010, p.4).

According to Kaufmann (2010) and KnowledgeWharton (2010), these deficiencies in preparedness reveal other profound issues or root causes. For instance, the MAE Center et al. (2010) assert that pre-existing conditions such as regional-economy disparities and political tensions between regions in Chile, stressed by the uneven concentration of population, power and resources, have contributed to the uneven impact of disasters, especially affecting the poor but significantly those who are more isolated and disconnected from centres of power. Other researchers such as Pulgar Pinaud (2014a) and Vidal and Romero (2010) have also underlined the role that socio-economic and political contexts in Chile play in shaping vulnerability to disasters. Pulgar Pinaud (2014a), for instance, asserts that neoliberal policies, such as land deregulation during the dictatorship of Augusto Pinochet, have create important social and spatial inequalities that may explain the uneven distribution of disaster impacts.

This uneven distribution of impacts contrasts with the widespread idea that highlights the heroism of people and the resilience of institutions. In the following section, I base the analysis on a series of historical documents to contest this 'typical' or mainstream view of disasters in Chile, which emphasises their 'naturalness' and their impacts. Here I suggest a departing point to understand how positivist perspectives on disasters may tend to blur the relevance of socio-economic, political and cultural pre-conditions that precede them, and which are crucial to comprehend the social cause of disasters.

### 4.1.1 The dominant view of the history of Chilean disasters: earthquakes

A diverse range of extreme natural events have affected Chile, however, earthquakes are probably the most remarkable. Most of the historical records (CREDEN, 2016) highlight earthquakes as they somehow represent 'milestones' in the history of Chile.

Many Chileans still have fresh memories of the Great Maule earthquake of February 27, 2010, and some of them remember where they were when great earthquakes occurred in 1960 (Valdivia) and 1985 (Central Chile). Elderly Chileans may still remember the 1939 earthquake in Chillán. Earthquakes and disasters have been recurrent throughout Chilean history.

Located in the so-called Pacific Ring of Fire, Chile is one of the most seismic regions in the world (EM-DAT, 2017). Chile sees the convergence of the Nazca plate and the South American continental plate, causing periodic earthquakes of varying magnitudes that sometimes trigger significant disasters. Thus, earthquakes and disasters have become part of the collective identity of Chileans (Ugarte and Salgado, 2014), being registered in popular culture through the oral tradition prior to the Spanish conquest in the sixteenth century (BNC, 2014).

According to Foerster (1995), prior to the Spanish Empire colonisation, indigenous peoples wove a network of symbolic and religious interpretations about earthquakes and disasters. In the Mapuche culture —the largest in the country— earthquakes and disasters were perceived as manifestations of a cosmic imbalance that must be recovered by offerings to gods and rites to the spirits of ancestors. As such, during the first decades of the conquest, the Spaniards may have felt the devastating effects of seismic activity itself in the region. In May 1647, the largest earthquake in colonial chronicles occurred, highlighting that the city of Santiago was reduced to rubble while it deepened an important economic crisis initiated in previous years (Amunátegui, 1882). A similar observation was documented during the 1751 earthquake in Concepción, the capital city of the Bio-Bio Region. This

disaster even prompted the relocation of the city. Records from the National Library of Chile (BNC 2014) also suggest that people mainly attributed earthquakes to someone's will and disasters as divine punishments.

In the early twentieth century, one of the most disastrous earthquakes in the new Republican era occurred. Grossi (1907) documented the destruction of the city of Valparaiso and thousands of human losses. Similar negative effects were registered for the disasters of Atacama's earthquake in 1922 and the earthquake in Talca in 1928 (BNC, 2014). The Talca disaster urged authorities and worker unions to implement disaster management and risk reduction measures: the first standards for anti-seismic construction of buildings and for the identification of disaster prone areas (Presidencia de la Republica de Chile, 1936).

In 1939, yet another earthquake struck which affected the city of Chillán and the entire surrounding region. It caused about 30,000 deaths and provoked the destruction of almost the entire city (Reyes Coca, 1999). As a result, the central government created an institutional body under Law N°6.434 called Corporation for Reconstruction, Relief and Production Development, which supported the government in planning and executing reconstruction projects throughout the country while promoting industrial development in all regions. These two objectives were combined because, by the 1940s, Chile was going through a process of industrialisation (Montecinos, 2005).

In most of the historical records kept by the Chilean government and the media following the 1960 Valdivia disaster,[9] attention was placed on the impacts and the costs of reconstruction, reinforcing the idea of the Chilean people's resistance against the forces of nature. Valdivia suffered one of the most devastating episodes in Chilean history. According to the U.S. Geological Survey (USGS, 2014), the May 22, 1960, registered 'the largest earthquake in the world' with a moment magnitude recording of 9.5 ($M_w$), causing extensive devastation in the provinces of Cautín,

[9] A list of media records consulted for this disaster is in Appendix 5.

Valdivia, Osorno, Llanquihue and Chiloé. This was accompanied by a *tsunami* that caused a series of waves that swept away coastal cities. According to government records (BNC, 2014), figures estimated a death toll of 1,655, a further 3,000 injured, two million homeless, and US$550 million in damage, causing further social impact and high costs in damage to neighbouring countries (see Table 4.1).

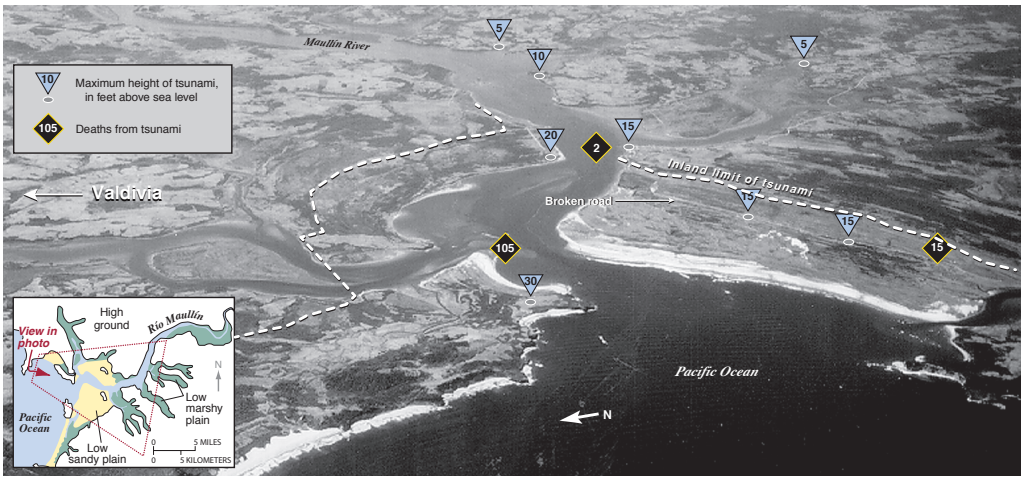
**Table 4.1. Impacts in neighbouring countries of the 1960 Great Valdivia earthquake**

| Location | Economic loss | Human loss |
|---|---|---|
| Hawaii | US$ 75 million | 61 deaths |
| Japan | US$ 50 million | 138 deaths |
| Philippines | No information available | 32 deaths + missing people |
| US West Coast | US$ 500,000 | No deaths registered |

*Compiled by the author (2017), based on La Nación (May 28, 1960) and USGS (2014)*

According to newspaper records and press releases of the time, this earthquake sank some areas to such an extent that they ended up being completely submerged (see Figures 4.2 and 4.3): it caused several landslides, and it initiated the eruption of the Puyehue volcano on May 23 the same year, which sent ash and steam as high as 6,000 metres in the sky for several weeks (BNC, 2014).

**Figure 4.2. Areas flooded by the 1960 Chilean *tsunami* in Maullín (near to Valdivia)**




*Source: USGS (1999)*

**Figure 4.3. Ships and factories destroyed by the 1960 Great Valdivia earthquake**


*Source: Castedo (2000, p.74)*

La Nación newspaper headlines the words of Pierre Lehmann –in charge of the reconstruction at the time–: "The battle of Riñihue is occurring on four fronts, and it is almost a victory", in reference to floods that were occurring in Riñihue in the Valdivia province. Pierre Lehmann asserts: "Engineers and workers are fighting to reduce the impacts of floods [...] their fight is against nature and time" (La Nación, June 10, 1960, p.1; see Figure 4.4). On June 22, 1960, the headline of the newspaper El Correo de Valdivia was: "The Image of Valdivia is painful and depressing [...] Despite the efforts made by people and the government, it looks like this time nature has really struck us hard". These assertions and headlines reflect the general idea in Chile that disasters and their impacts were about a 'fight' and 'struggle' against nature's will (Gould et al., 2016).

**Figure 4.4. La Nación's headline, June 10, 1960**

TIEMPO PARA SANTIAGO: Bueno.
TEMPERATURA DE AYER: máxima, 13.4 grados C a las 16.26 horas; mínima, 7.3 grados C a las 7.40 horas.
APRECIACION GENERAL — Buen tiempo, con nebulosidad matinal en el litoral de las zonas norte y central y nieblas entre Temuco y Osorno, disipando alrededor del mediodía.

LA NACION

AÑO XLIV — SANTIAGO DE CHILE. VIERNES 10 DE JUNIO DE 1960 — PRECIO: E° 0.05 — N o 15 528

EDICION DE 24 PAGINAS

DECLARO PIERRE LEHMANN:

"La Batalla del Riñihue" se da en 4 frentes y está prácticamente ganada

Dramática carrera contra el tiempo libran los ingenieros

En cuatro frentes combaten dramáticamente ingenieros y obreros para atenuar y disminuir las devastaciones que podría ocasionar el rebalse de las aguas del lago Riñihue. Su lucha es contra la naturaleza y contra el tiempo, manifestó ayer el vicepresidente de la CORFO, Pierre Lehmann, quien está a cargo de esta batalla.

El primer frente consiste en abrir canales en los tacos que tapan el desagüe del lago. El segundo es la lucha por afianzar el terreno de esos tacos, de tal manera que cuando el lago se rebalse, no arrastre rápidamente con millones de toneladas de arcilla y barro sobre Valdivia, sino que los vaya gastando lentamente. El tercero reside en levantar el nivel de la desembocadura del Riñihue en el Río San Pedro, con el objeto de que quede más agua aprisionada en la hoya del lago, y el cuarto frente es el levantamiento de barreras en los ríos que traen hacia el Riñihue agua de otros lagos, con el fin de que éste no continúe subiendo de nivel.

*Source: La Nación, June 10, 1960 (other newspapers reviewed are listed in Appendix 5)*

In an interview in May 1960, President Jorge Alessandri referred to the Valdivia disaster and spoke to the affected population:

> "The president of the nation visits the south [...] he highlights the wholeness of Chilean people that faced the event and their capacity to resist [...] Earthquakes do not distinguish between men and women, adults and children [...] Nobody doubts that the temper of Southern men will be able to resist future disasters and to recover from this".
>
> (La Nación, May 24, 1960)

This reaffirms the narrative of politicians on disasters as a 'struggle' against nature, where our only hope resides in the individual and collective capacity to react and resist. A quick revision of the government's press releases after the 1960 Valdivia earthquake confirm the general reference to a 'force of nature' and men's strength to resist such events (see Appendix 5).

More recently, the disaster triggered by the 2010 Maule earthquake is of particular interest because its magnitude, its level of destruction, and its economic and human

costs (Han, 2010; Navia, 2010; Volk, 2010). A few hours after the earthquake, President Bachelet was quoted as saying:

> "We are facing a massive catastrophe which has caused damage that will require an enormous effort by both the public and private sectors, one of the largest [efforts] in the history of the country. […] Once again our ability to deal with adversity and get back on our feet [is tested]. And we are examining every way to restore all the basic services in the country".
>
> (Bachelet, 2010, translated by Gould et al., 2016)

Bachelet addressed the nation, pointing out that the disaster was tragic and serious but at the same time limited and manageable. According to Gould et al. (2016), this and other statements rely on a formulation already familiar to Chileans: "the state as possessing the human, economic, and technical resources to overcome great challenges, including national/natural disasters" (Gould et al., 2016, p.100). This reaffirms the narrative of politicians and the elite about the mainstream view in the Chilean history of disaster, which restricts the causes of disasters to natural factors.

In her May 21 Speech of 2015, Bachelet remembered the 2008 Chaitén volcanic eruption to point out the success of the different institutions in coping with such extreme events: "Chaitén is a successful case where all institutions worked together to protect the population" (Presidential May 21 Speech, May 2015). This perspective is mainly supported by the fact that no fatalities were registered during the eruption. However, this neglects determinant aspects of risk and disaster, such as the role of the economy and politics that influence people's capacity to resist and recover from disasters (Wisner et al., 2004). Once more, political rhetoric and historical records emphasise the number of deaths and other material impacts such as destroyed houses. Rarely is attention paid to the socio-economic and political pre-conditions that situated men and women in disaster prone areas or make them more vulnerable to disasters in the first place.

### 4.1.2 History of disasters triggered by other extreme events

Disasters in Chile are not only triggered by earthquakes, but also by other extreme natural events. For instance, some authors (Smink, 2011) suggest that volcanic eruptions have an important role in the history of Chilean disasters because of their social and economic impacts. It is well known that there are an estimated 2,000 volcanoes in Chile –the second highest number after Indonesia (Casertano, 1963)– of which 100 are considered active volcanoes and only 50 are being regularly monitored (OVDAS, 2014). Recent disasters related to volcanic activity are the Villarrica and Lonquimay volcanic eruptions in 1984 and 1989 respectively, and the Hudson eruption in 1991 that incurred important economic costs in agriculture and in the livestock industry (Berezin, 2012). In 2011, the Puyehue volcanic eruption provoked the displacement of more than 4,000 people in Los Ríos Region, significant air traffic disruption, and economic costs for the local industry (Abumohor and Díaz, 2011). But perhaps the most emblematic case is the eruption of the Chaitén volcano in 2008 that caused the displacement of more than 8,000 men and women, made 4,000 people homeless, and incurred around US$ 70 million in economic costs (Presidencia de la República de Chile and Narváez, 2009). In this case, great emphasis was given to the 'effectiveness' of the evacuation procedures because there were no fatalities during the emergency (Galilea, 2013). Nevertheless, unforeseen effects of policy responses and decisions made during the subsequent years may have triggered the return of people to the city in spite of volcanic risk. This issue will be addressed in greater detail in Chapter Five.

Likewise, other disasters in recent Chilean history were triggered neither by earthquakes nor by volcanic eruptions. Once more, however, emphasis has been put on the impacts and the suffering of people, neglecting almost completely the importance of the social, economic and political pre-conditions that surrounded such disasters. One example is the Great Fire of Valparaiso that occurred between April 12 and 16, 2014. According to the ONEMI (2014a), the fires caused 15 deaths, injured more than 500 people, destroyed 2,900 dwellings and made more than 12,500 people homeless. There is not yet any public information from the ONEMI,

the main state institution on disasters, pointing out the underlying causes and drivers of such a disaster, despite researchers having already pointed to land market deregulation and urban segregation (Pino, 2015; Pino and Hormazabal, 2016).

According to the ONEMI (2014b) and the United Nations International Strategy for Disaster Reduction (UNISDR, 2014a), floods and storms have also been recurrent in the recent history of Chilean disasters, often leaving people displaced and homeless and incurring important economic losses. Perhaps the most important disaster related to flash floods and mudflows in Chile's recent history occurred between March 23 and 25, 2015, in northern Chile. ONEMI and the media highlighted that flooding caused at least 34 deaths and made 30,000 people homeless (Cooperativa, 2015; ONEMI, 2015).

In general, politicians, researchers and the media have considered Chilean disaster management performance –the actions of people, civil society, institutions and authorities– as 'positive' (American Red Cross Multidisciplinary Team et al., 2011; Kaufmann, 2010; López Tagle and Santana Nazarit, 2011; MAE Center et al., 2010). This interpretation is strongly linked to the low number of casualties. However, more and more researchers are pointing out the social costs of reconstruction and the failure of emergency and recovery strategies as disasters' levels of impact in terms of economic and social costs have significantly increased (Gobierno de Chile, 2014). Such literature calls for a more active *ex-ante* role of institutions in handling disasters (González-Muzzio, 2013; Pulgar Pinaud, 2014a, 2014b; Romero and Albornoz, 2013; Romero et al., 1999; Vidal and Romero, 2010), aiming to address potential causes and drivers of risks focusing on preparedness and mitigation rather than concentrating only on *post-ante* emergency response, relief and compensation.

From a multiplicity of official sources, governmental reports, media archives and historiography, I elaborated a list of disasters triggered by 'natural' hazards in Chile (see Table 4.2), collecting the main aspects referenced within each document in order to visualise a 'pattern' of the official narrative on the history of Chilean disasters.

**Table 4.2. Disasters related to extreme natural events in Chile (1562-2016)**

| Year | Event | Area | Aspects highlighted |
|---|---|---|---|
| 1562 | Earthquake | Concepción | 8.0-magnitude earthquake estimated. Changes in geography, houses destroyed and fatalities (Quezada, 1999). |
| 1570 | Earthquake | Concepción | The first documented earthquake in Chile. Destruction of houses and economic losses (Palacios Roa, 2016). |
| 1575 | Earthquake | Valdivia | The force of nature (Mariño de Lobera, 1960). |
| 1647 | Earthquake | Santiago | Central Chile is devastated and this provoked an intense economic crisis (BNC, 2014). |
| 1657 | Earthquake | Concepción | The force of nature and reference to God (BNC, 2014). |
| 1730 | Earthquake | Santiago and Valparaíso | The force of nature and reference to God (Quezada, 1999). |
| 1737 | Earthquake | Concepción | Economic losses and damage to the built environment (Quezada, 1999). |
| 1751 | Earthquake | Concepción | The force of nature and reference to God (Quezada, 1999). |
| 1819 | Earthquake | Copiapó | Economic losses (BNC, 2014). |
| 1822 | Earthquake | Santiago and Valparaíso | The force of nature and human losses. 200 deaths estimated (Fuentes et al., 1823). |
| 1835 | Earthquake | Concepción | The force of nature (BNC, 2014). |
| 1837 | Earthquake | Valdivia | The force of nature (BNC, 2014). |
| 1868 | Earthquake and *tsunami* | Arica | The force of nature and economic losses (BNC, 2014). |
| 1877 | Earthquake | Santiago | The force of nature (BNC, 2014). |
| 1906 | Earthquake | Valparaíso | Earthquake destroyed the port of Valparaíso and gave rise to commercial problems (Grossi, 1907); almost 20,000 deaths. |
| 1922 | Earthquake and *tsunami* | Atacama | The force of nature and economic losses (BNC, 2014). |
| 1928 | Earthquake | Talca | Earthquake destroyed around 75 per cent of the city. This event gave rise to the General Law of Construction and Urbanisation in 1931 (Presidencia de la República de Chile, 1936). |
| 1939 | Earthquake | Chillán | CORFO created to coordinate reconstruction and economic recovery (CORFO, 2014). |
| 1960 | Earthquake and *tsunami* | Valdivia | Southern Chile devastated, important economic and human losses. The most disastrous event in Chile's history (USGS, 2014). |
| 1965 | Floods | Atacama and Los Lagos | 600 deaths and 375,000 affected people (Rojas et al., 2014). |
| 1965 | Earthquake | La Ligua | The 7.4-magnitude earthquake and its associated disaster promoted the creation of the ONEMI in 1974 (ONEMI, 2014b). |
| 1971 | Earthquake | Central Chile | Earthquake heavily affected Illapel, Los Vilos, Salamanca, Combarbalá, and La Ligua. It generated the creation of the Chilean Standard for Seismic Design of Buildings (NCh433) in 1973 (BNC, 2014). |
| 1980 | Mudflows | Santiago | 3 deaths and US$ 500,000 in losses (SERNAGEOMIN, 2017). |

| Year | Event | Area | Aspects highlighted |
|---|---|---|---|
| 1982 | Storm and floods | Santiago | Floods and homeless people (BNC, 2014). |
| 1984 | Volcanic eruption | Villarrica | Displaced people (ONEMI, 2014b). |
| 1985 | Earthquake | Central Chile | About 1 million affected people (ONEMI, 2014b). |
| 1986 | Storm | O'Higgins | Homeless people (BNC, 2014). |
| 1987 | Mudflows | Santiago | 41 deaths and US$ 12 million in losses (SERNAGEOMIN, 2017). |
| 1989 | Volcanic eruption | Lonquimay | Displaced people (BNC, 2014). |
| 1991 | Volcanic eruption | Aysén | Hudson volcano eruption affected livestock industry and agriculture (OVDAS, 2014). |
| 1991 | Mudflows | Antofagasta | 110 deaths and US$ 80 million in losses (SERNAGEOMIN, 2017). |
| 1993 | Volcanic eruption | Northern Chile | Láscar volcano eruption caused air traffic disruption in Chile, Argentina and Brazil, and affected the livestock and agriculture industry (OVDAS, 2014). |
| 1993 | Storm and mudflows | Santiago | 26 deaths; housing units and infrastructure destroyed for a total of US$ 5 million (SERNAGEOMIN, 2017). |
| 1997 | Storm | Central Chile | Economic losses (BNC, 2014). |
| 2002 | Storm | Santiago | Economic losses (BNC, 2014). |
| 2005 | Earthquake | Tarapacá | Displacements and destruction of heritage buildings (ONEMI, 2014b). |
| 2006 | Storm | Biobio | Economic losses (BNC, 2014). |
| 2007 | Earthquake | Aysén | Negative economic effects in the region (ONEMI, 2014b). |
| 2008 | Volcanic eruption | Chaitén | About 8,000 displaced people –and homeless– and 75 per cent of the city destroyed (Ugarte and Salgado, 2014). |
| 2008 | Storm | Araucanía | Economic losses (BNC, 2014). |
| 2010 | Earthquake and *tsunami* | Maule and Central Chile | 8.8-magnitude scale earthquake triggered the displacement of 2 million people, more than 500 deaths and around US$ 30 billion in losses (EM-DAT, 2017). |
| 2011 | Storm | Coquimbo | Economic losses (ONEMI, 2014b). |
| 2011 | Volcanic eruption | Puyehue | Economic losses (ONEMI, 2014b). |
| 2012 | Storm | Atacama | Economic losses (BNC, 2014). |
| 2014 | Earthquake | Iquique | Disaster left 1 million displaced people, 2,500 housing units destroyed and 8 deaths (ONEMI, 2014c). |
| 2014 | Fires | Valparaíso | This disaster left 15 deaths and more than 12,500 homeless people (ONEMI, 2014a). |
| 2015 | Floods and mudflows | Northern Chile | At least 34 deaths and 30,000 homeless (ONEMI, 2015). |
| 2016 | Floods | Santiago | Affected and displaced people. Problems with planning (T13 Noticias, 2016). |

*Compiled by the author (2017)*

Table 4.2 traces 48 events related to earthquakes, *tsunamis*, storms, volcanic eruptions, fires, floods and mudflows. A simple frequency distribution shows us that disasters triggered by earthquakes (55.3 per cent of the total disasters) are far more represented in the list than any other event, even the second and third most frequent disasters combined, being storms (19.1 per cent) and volcanic eruptions (12.8 per cent). Of course, not all disasters in the history of Chile are represented here: nor are all those related to extensive risk or those disasters associated with cumulative impacts, such as droughts, air pollution and landslides. However, this table attempts to illustrate the clear relevance of a specific way of portraying disasters –that is, in terms of their human and economic losses. In other words, this way of constructing the history of Chilean disasters overlooks and hinders study of the causes, pressures and conditions that make men and women and assets vulnerable in the first place.[10]

### 4.1.3 Other issues in the mainstream view of the history

Section 4.1.1 showed how, after certain disasters in Chile, some institutions and regulations were created precisely to deal with disaster impacts. This reflects that, in a certain way, the model of disaster and risk management has been conceived to be reactive: oriented to solve disaster impacts, focusing almost exclusively on life saving, emergency response, rehabilitation and relief.[11] This orientation, however, has had immediate and positive impacts on the development of the Chilean history of disasters, such as the reduction of human losses.

As the 2016 CREDEN report asserts, the development and effects of the ONEMI in the 1970s can be seen as evidence that the creation of institutional mechanisms plays an important role in disaster risk reduction (Thiruppugazh, 2014). According to EM-DAT (2017), for instance, the top five deadliest disasters in Chile's history are

[10] In 2016, the central government published a report that displays a timeline of disasters in the history of Chile (CREDEN, 2016, p.36-37). Similar to Table 4.2., such a timetable corroborates the observation made here (see Appendix 6).

[11] The model of DRM and DRR will be reviewed in greater detail in section 4.4.

found before the 1970s (highlighted in grey in Table 4.3), the same decade that the ONEMI was created, and thus indicate the materialisation and institutionalisation of the major Chilean state's effort in DRM and DRR.

**Table 4.3. Top 10 disasters in Chile between 1900 and 2015 sorted by human losses**

| Event | Location | Magnitude | Date | Human losses |
|---|---|---|---|---|
| Earthquake | Chillán | 7.8 $M_w$ | 1939 | ~5,500–30,000 |
| Earthquake | Valparaiso | 8.2 $M_w$ | 1906 | ~20,000 |
| Earthquake and *Tsunami* | Valdivia | 9.5 $M_w$ | 1960 | ~2,000–6,000 |
| Earthquake and *Tsunami* | Vallenar | 8.5 $M_w$ | 1922 | ~1,000–2,000 |
| Floods | Atacama and Los Lagos | N/A | 1965 | ~600 |
| Earthquake and *Tsunami* | Maule | 8.8 $M_w$ | 2010 | 562 |
| Earthquake | La Ligua | 7.4 $M_w$ | 1965 | ~400–500 |
| Earthquake | Talca | 7.6 $M_w$ | 1928 | ~220–290 |
| Mudflows | Antofagasta | N/A | 1991 | ~110–141 |
| Mudflows | Atacama | N/A | 2015 | ~87–178 |

*Compiled by the author (2017), based on CREDEN (2016), EM-DAT (2017) and Rojas et al. (2014)*
*$M_w$ = Moment magnitude scale*

As Table 4.3 shows, the ONEMI certainly had an important effect on reducing the human cost of disasters. But this does not necessarily mean that disasters have stopped affecting Chile's path to development in other important and costly ways. For instance, as Table 4.4 shows, the number of affected people stemming from natural extreme events has increased since the creation of the ONEMI to the point where seven of the ten most 'important' disasters occurred after 1965 (highlighted in grey).

**Table 4.4. Top disasters in Chile (1900-2015) sorted by affected people and costs**

| No. of affected people | Disaster/Year | Year/Disaster | Economic costs in US$ M |
|---|---|---|---|
| 2,671,556 | Earthquake 2010 | 2010 Earthquake | 30,000,000 |
| 2,348,973 | Earthquake 1971 | 1985 Earthquake | 1,500,000 |
| 2,003,000 | Earthquake 1960 | 2015 Mudflows | 1,500,000 |
| 1,482,275 | Earthquake 1985 | 2013 Heatwave | 1,000,000 |
| 513,387 | Earthquake 2014 | 1939 Earthquake | 920,000 |
| 375,000 | Flood 1965 | 1960 Earthquake | 550,000 |
| 242,345 | Storm 1984 | 1953 Earthquake | 500,000 |
| 221,842 | Flood 2002 | 1999 Fires | 280,000 |
| 139,667 | Flood 2000 | 1971 Earthquake | 236,400 |
| 120,000 | Mudflows 2015 | 1963 Earthquake | 235,000 |

*Compiled by the author (2017), based on EM-DAT (2017) and SERNAGEOMIN (2017)*

Tables 4.3 and 4.4 seem to suggest that Chile has performed well in reducing human losses in disasters –as is also true for the case of Chaitén– but not necessarily as well in reducing their social and economic impacts. The most important disasters in Chile, in terms of economic costs, occurred after the creation of the ONEMI in 1974.

This shift from the human to the social and economic costs of disasters could be related to the natural population growth or economic development, as suggested by UNESCO et al. (2012). However, this change questions the holisticness of a model of managing risks and reducing disasters. By holisticness, I refer to the comprehensiveness of the model, its treatment in reducing risks holistically, looking at the underlying causes as well as the unsafe conditions that give rise to vulnerability. Perhaps the case of 2010 Maule earthquake, which was low in terms of deaths but high in economic losses, can help us to visualise this issue.

According to the government and other records (EM-DAT, 2017; Gobierno de Chile, 2014), in 2010 there were 2.6 million affected and displaced people, and 373,784 housing units destroyed or partially destroyed as a consequence of the earthquake. This caused enormous social and economic impact in the months and

years after 2010: men and women in affected areas and communities organised themselves in different ways to demonstrate their dissatisfaction with the government's strategies and plans for reconstruction and recovery (Pulgar Pinaud, 2014a, 2014b). Furthermore, reactive and top-down approaches to recovery and reconstruction utilised by the government apparently created conditions that exacerbated the underlying causes of vulnerability, reproducing it and perpetuating risks in the long term (Imilan et al., 2015). In a way, post-disaster Chaitén fully represents a neat example of how a recovery and reconstruction plan does not consider local participation, aspirations and demands, and people's 'positive' efforts, and so opens up the possibility of the emergence of sources of vulnerability and risk.

When the recent history of Chilean disasters is investigated through governmental documents and media archives, there are very few allusions to, and often disjointed information about, the conditions preceding disasters –that is, the socio-economic, political and cultural processes that place people at risk and make them more vulnerable to disasters in the first place, such as living in disaster-prone areas, their level of education, access to health and other urban services, poverty and the like. The attention and efforts, then, have tended to focus on the effects of disasters in lieu of to their root causes.

This dangerous missing and ignored element of Chilean disaster history is, for me, a cyclical aspect. Reducing response, relief, rehabilitation and reconstruction to technical solutions and the provision of basic needs means neglecting how post-disaster strategies can contribute significantly to reduce future vulnerability and exposure to disasters. Whilst investment in disaster risk management may help to reduce deaths during extreme events, the social and economic costs associated with disasters can also, over time, erode societal structures, affecting people's ability to resist, cope with and recover from future disasters (UNISDR, 2011).

This brief review of the history of Chilean disasters therefore aims to point out that the dominant narrative is characterised by a strong emphasis on post-disaster

impacts and losses, while the vulnerable pre-conditions of people, along with the socio-economic and political circumstances that facilitate their production, are often neglected. I think that these dominant views, over time, may have created –from a hermeneutical point of view– a reactive or post-event oriented model of DRM in Chile. Furthermore, I consider that a managerial model that mainly focuses on emergency response and relief, without a long-term view seeking to avoid reproducing the existing vulnerabilities and risks –or producing new ones– is somehow missing the opportunity to effectively reduce disaster risks.

The upcoming sections address another aspect of the history of Chilean disasters: the development of DRM and DRR models and their related institutional forms. However, such analysis need to be conducted bearing in mind that we are constructing a multi-scalar perspective to look at the progression of vulnerability in the case of Chaitén. This requires us to go back to the history of the state territorial organisation through which the DRM institutional forms –such as the ONEMI– can be better interpreted from a scalar viewpoint.

## 4.2 The 'logic' of the state territorial organisation of Chile

By making sense of the state territorial organisation of Chile and its territorial/scalar configuration, this section aims to lay the groundwork for interpreting the progression of vulnerability as a multi-scalar process in the case of Chaitén. I propose here that the state territorial organisation has had, and has today, an important influence on the way DRM and DRR are conceived and executed, and therefore also influences decision-making, policy responses to disasters and disaster governance. In the two following sections I address the territorial structure of Chile, tracing its evolution from the origins of the nation state in the nineteenth century to the present.

### 4.2.1 The origins of the territorial structure of the state

As argued by Brenner (2001, p.599), the social production of scale is subordinated to socio-political contestation and is therefore "historically changeable" and

malleable. In reconstructing a scalar geography of Chile, a historical review of its state territorial organisation becomes indispensable. By state territorial organisation, I refer to the structure of the nation-state power and its apparatuses and how these are spatially organised at different scales (Brenner, 1997, 1998). This encompasses the hierarchical organisation and the spatial distributions of state power in terms of governance, economy and politics (Lopez-Basaguren and Leire Escajedo, 2013; Brenner, 1997). In global-city literature, the scalar forms of state territorial organisations have been studied since the 1980s, arguing that such forms may vary over time, depending on the mode of production –especially under capitalism– and the social relations and struggles that are originated within (Brenner, 1997). In this section, I focus on the two main scalar forms of territorial organisation in the history of Chile, centralised and federalist models, but particularly on the processes of centralisation and decentralisation as distinctive forces in shaping the current territorial structure of the country.

The analysis starts with the Chilean process of decolonisation from the Spanish Empire that took place between 1808 and 1824 (Silva, 1995). According to Montecinos (2005), specific social, economic and political circumstances which precipitated the emancipation can help to explain the current "territorial centrality" of the Chilean state (Montecinos, 2005, p.440). These circumstances include poor colonial administration, trade monopoly, postponement of *Creoles*, absolutism and tyranny of colonial authority under both the Bourbon and the Hapsburg model. Equally important are the philosophical influences from the Enlightenment among *Creole* authorities, the French Revolution, and the Independence of the United States.

After 1810, similar to other Spanish colonies, Chile developed a process of decolonisation from the Spanish Empire and, with this, started the creation of the nation-state (in the sense suggested by Appadurai, 1996). The initial composition of the Chilean state was designed by the Government Junta of Chile or *Primera Junta de Gobierno* (Collier and Sater, 1996). The Junta, due to the imminent war against

the Spanish Empire, established wide political and military powers for the Head of the State, the *Director Supremo* or Supreme Director. The state project was concluded by issuing its first constitution in 1818, which maintained broad designated power to the Head of the State but also considered the separation of the state powers –i.e. the Supreme Director (executive), the Senate (legislative) and the Supreme Court (judicial)– and at least three *provincias* or regions: Coquimbo, Concepción and Santiago, the latter being the capital. According to Montecinos (2005), during this initial phase, the Supreme Director Bernardo O'Higgins governed following the previously established centralised patterns of the Spanish Empire. The state power was thus centralised in its capital Santiago de Chile and in the figure of *Director Supremo*.

In 1823 a new constitution was issued. In its Chapter XIX, municipalities received their first recognition as minor spatial entities which were subject to the orders of the Departmental Councillors (Silva, 1995). Councillors had to be appointed by the executive branch or the Supreme Director. This constitution was the first to refer to different aspects of the territorial structure of the state. For instance, that the State of Chile is declared 'unitary and indivisible' –so provinces or regions and municipalities cannot be considered as being part of the state– and its sovereignty resides in the 'nation' (Congreso Nacional Constituyente, 1823).

In early 1826, the so-called 'federal laws' were drafted by José Miguel Infante, a Chilean politician and admirer of the US federal system. These laws sought to transform the figure of the Supreme Director into the President of the Republic and delegate more autonomy to the provinces (Silva, 1995). However, the constitutional law was never written because José Manuel Infante lost the presidential elections that year (Donoso, 1963). This constitutional attempt resulted in a precedent for future struggles to restructure the state territoriality. Its proposals included the division of the territory into eight provinces (Coquimbo, Aconcagua, Santiago, Colchagua, Maule, Concepción, Valdivia and Chiloé) and that all authorities, including governors and parish priests, would be subject to a popular vote.

According to Montecinos (2005), this federalist attempt was produced as a result of the claims for autonomy by the provinces of Coquimbo and Concepción in opposition to the centralism dictated by Santiago.

Between at least one *coup d'état* and several other constitutional arrangements, the State of Chile "settled down" and came to form the construction of a "strong and centralised" country by 1833 (Montecinos, 2005, p.449). *Villas* or municipalities were acknowledged as minor administrative-spatial units, and the nation as the centrality from which order emanates. Each municipality must have an *Alcalde* or Mayor and each province an *Intendente* or Governor, both directly selected by the executive branch whose power resides in the Head of the State, the President of the Republic. The constitution of 1833 was in rule until 1925, a period of almost 100 years. According to Villalobos (1987), the 'doctrinal content' of the constitution encompassed the fundamental basis of a centralised institutional regime: national sovereignty, representative regime, division of state powers, governmental accountability and individual rights. Thus, this constitution established that the nation and its territoriality were to be exclusively delegated by national authorities, in this way centralising the administration of the state into the executive branch located in Santiago (Gran Convención de Chile, 1833).

In the period between the 1833 and 1924, nevertheless, territorial reconfigurations were not abandoned. The parliamentary system was introduced in 1891 which, in the following years, produced several constitutional reforms, including important autonomic measures such as municipal participatory budgeting and voter assemblies in provinces. However, by 1924, a military *Pronuncimiento* –a military rebellion, but different from a *coup d'état*[12]– ended any, and the hitherto achieved, parliamentary attempts in Chile. In its place, the presidential system was re-

[12] In a typical *coup d'état*, a rebel faction which controls some critical element of the armed forces seizes control of the state by a sudden movement, organised and executed in stealth; in a *pronunciamiento*, a group of military officers publicly declare their opposition only to the current government –that is, to the current chief executive and cabinet– who may be legally elected civilians or the result of a previous coup (Luttwak, 1969).

established by the Junta government. The first significant reform of the restored order was the dissolution of all municipal representatives and the designation of regional *intendentes* in their place (Salazar and Pinto, 1999).

After 1925, the centralised organisation of the territory was thus initiated by a doctrine based on the assumption that the success of municipalities and provinces was only possible through their alignment with national plans (Montecinos, 2005). The goal was to 'discipline' the municipalities under a national development plan that was promoted by President Ibáñez (Salazar and Pinto, 1999). The period between 1925 and 1973 is known as a 'democratic presidential' era. It is a phase marked by the rise of the middle class, great prosperity and sustained increases in living standards, including improvements in education and health, and the country was undergoing a process of industrialisation. This period also saw the implementation of several political and economic models, such as the socialist model during the Salvador Allende administration, and the Keynesian with President Aguirre Cerda. The latter had an important influence on the state territorial organisation of that time. In 1938, the republican-political alliance called *Frente Popular or* Popular Front won the presidency, the leader being the Radical Party politician Pedro Aguirre Cerda. President Aguirre Cerda implemented a Keynesian style economic model with strong state intervention in the national economic development (Montecinos, 2005).

The result of this 'developmental' inspiration was that the 'state territorial organisation' adopted new significance as a strategic tool of the state in order to promote economic growth and development in the country. In 1939, the Production Development Corporation (CORFO) was founded and thus the state took the helm as the motor of industrial dynamism and national growth. A consequence of industrialisation processes and the obsession with economic development and growth was that the principal cities of Chile –Santiago, Concepción and Valparaíso– emerged (Frías, 1960).

### 4.2.2 Approaching the current state territorial organisation

In the period from 1925 to 1973, we can find the most direct predecessors to the current territorial structure of the Chilean state. Montecinos (2005, p.455) defines this period as an attempt to reconfigure the state territoriality, and calls it "the first regionalisation". Remember that the period before 1925 was characterised by demands coming from strong regionalist and federalist movements that were born in the provinces and, in most cases, had violent outcomes by means of revolution or armed uprising. These decentralising demands were considered, reflected upon and mentioned in a specific article of the constitution:

> "The laws will entrust gradually to provincial or municipal agencies the authority and administrative powers currently exercised by other authorities, in order to proceed with the decentralisation of the national administrative system".
>
> (Constitución Política de la República de Chile, 1925, Article N°107)

This article described a process of 'administrative decentralisation' which sought to promote economic development (Boisier, 2000). Since 1939, CORFO had stimulated a new process of territorial organisation based on the economic development of the country. This new organisation delineated six major productive regions: Norte Grande, Norte Chico, Núcleo Central, Concepción and La Frontera, Región de Los Lagos, and Región de Los Canales. These productive-administrative divisions supposedly aimed to integrate people and human resources within a national developmental plan. However, this did not take into account the socio-spatial fabric of major ancient socio-economic and cultural groups such as the Magallanes people in the South, the Mapuches in Central Chile and the Aimaras in the North (Montecinos, 2005). According to Boisier (2000), the new division delivered more autonomy to neither Concepción nor Coquimbo –regions that had historically demanded more power– because it was mainly based on the spatial distribution of natural resources. Thus, the principal objective of this 'first regionalisation' was to encourage the economic development of each region based on its geographical and economic characteristics (Boisier, 2001).

In 1965, the National Planning Office (ODEPLAN) increased regionalisation by establishing new regions based on a system of poles of economic development. This time, the territory was divided into eleven regions and one metropolitan area. This 'regionalisation' was characterised by the designation of central spatial units, determined by a city as a hub that was to connect the rest of the region. Santiago and its metropolitan area were established as the main centre of national development, while the three poles of multi-regional development were Antofagasta, Valparaíso and Concepción. A third hierarchical level was composed by another set of sub-poles of regional development which were first politically and then economically subordinated to the aforementioned regional poles (Montecinos, 2005). By observing such hierarchies, it is then possible to understand better the underlying processes that have produced the current geographical and scalar organisation of the Chilean state, as this logic of organisation continued in the 1970s.

Alongside the arrival of the military dictatorship in 1973, there was a phenomenon that Montecinos (2011) considers paradoxical: instead of increasing the centralisation of the country, the dictatorship headed by the General Augusto Pinochet gave a strong impetus to the process of regionalisation and administrative decentralisation already started in the 1950s. Decree Nº212, from December 17, 1973, created the National Commission for Administrative Reform, or CONARA (Boisier, 2000). CONARA established the current national political-administrative division of Chile, consisting of thirteen regions. Thirty-four years later, a major modification to this spatial division was made in 2007 through the creation of two additional regions: Los Ríos Region and the Arica and Parinacota Region (see Appendix 7). According to Montecinos (2005), the military government discourses on state territorial organisation in the 1970s was focused on the geographic and economic potentialities of each region, and argued that this division would promote better integration of citizens, national security, socio-economic development and better national administration. In other words, the military government continued the process of administrative decentralisation initiated since the constitution of

1925. Likewise, the development of a national security system intended to achieve border security and internal cohesion by inhabiting the territory of 'unoccupied' spaces (Boisier, 2000). Although the foundation of Chaitén occurred in 1940 within an 'unoccupied' region, it was only during the 1970s that an important influx of people and economic progress took place (Delgado et al., 2005).

In the 1970s, the creation of regions displaced the power from provincial to regional governments, thus giving them more recognition and resources to implement the regional development plans (Szary, 1997). With this solution, the national government aimed to keep a united country but without falling into a "utopian federalism" while promoting economic development with territorial and political harmony (Montecinos, 2005, p.458). However, more than 30 years after the first regionalisation, the dialectic of centralisation and decentralisation processes – federalist and regionalist– is still considered an unsolved issue in the Chile of today (SUBDERE, 2000). According to Boisier (2001), this issue has created an imbalance between an administrative decentralisation and one political, where concrete redistribution of power to sub-national levels has not occurred. Moreover, Boisier (2001) asserts that administrative decentralisation has not secured a balanced distribution of the economy in the territory. On the contrary, since the 1980s, the concentration of wealth, income opportunities, and economic and political power in the Santiago Metropolitan Region has increased (Atienza and Aroca, 2012).

In sum, within the history of the Chilean territorial organisation, it is possible to distinguish various centralisation and decentralisation attempts: however, there are two clearly identifiable and distinctive styles of decentralisation: endogenous decentralisation and vertical decentralisation. The first is described as a "bottom-up" process (Montecinos, 2005, p.461) with a strong regional-political component based on revolutionary attempts of involving a radical change to the model of government and constitutional order. These, implemented in some cases, include attempts to federalise the country in 1826, 1851 and 1859. Another endeavour was the attempt to move the country from a highly centralised presidential system to a parliamentary

system, in practice for 34 years between 1891 and 1925. Both attempts brought no radical institutional changes and policy outcomes; nor were they manifested in Chilean social and political life (Boisier, 2001). On the contrary, the failure of these attempts became sufficient reason to react and recentralise power in both 1833 and 1925.

The second style, described as a "vertical decentralisation" or top-down (Montecinos 2005, p.461), is characterised by governments deciding on a policy of decentralisation with an administrative emphasis –a decentralisation of the functions of the state aiming to contribute to the process of its modernisation and economic growth in the country. In this period and under this logic, main government institutions and frameworks for disaster management and risk reduction are consolidated, such as the ONEMI, municipal emergency plans and territorial planning instruments (IPTs). These will be fully addressed in section 4.4. To end this historical revision, I will address the current structure of the Chilean territory.

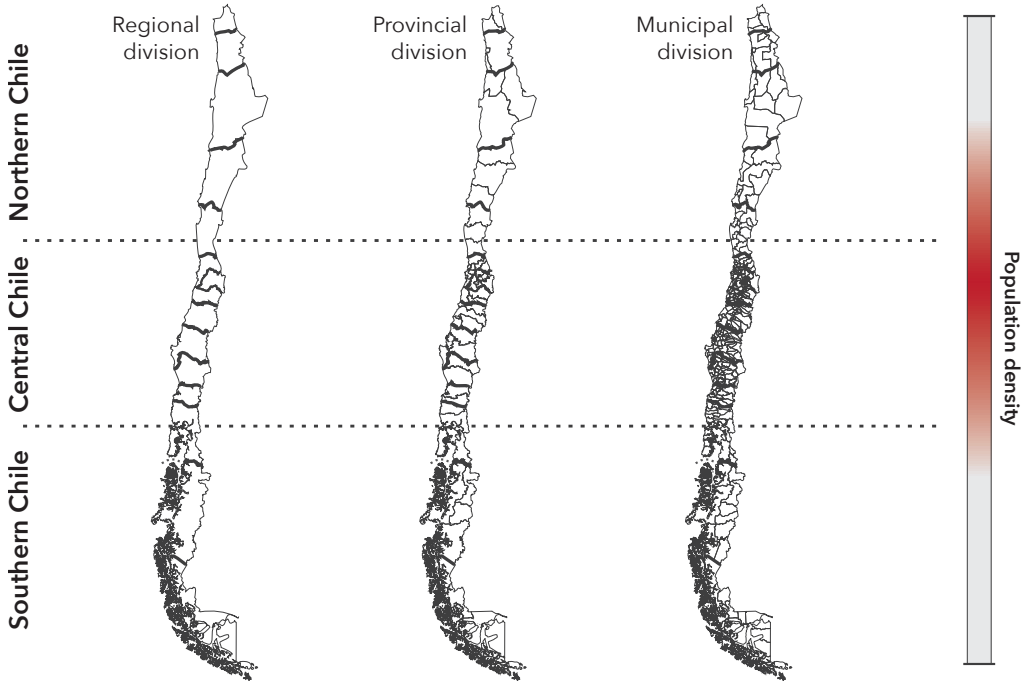
### 4.2.3 The territorial structure of the state and the government

The current territorial organisation of Chile is characterised by a vertical decentralisation where most of the functions of the state –the administration of state services including civil protection– are territorialised into regional spaces, but these functions still maintain a high subordination to and dependency on national powers (Montecinos, 2013). Today, *intendentes* –or regional governors– and provincial governors are directly elected by the President of the Republic, whereas mayors and the Municipal Council have been democratically elected since the 1990s (Szary, 1997).

In trying to capture the centralising character of the territorial state, the political-administrative divisions of its territory could be a good example. As displayed in Figure 4.5, the division of minor administrative spatial units is concentrated in Central Chile. Since the concentration of minor administrative divisions is also the result of population density –Central Chile is inhabited by more than 80 per cent of

the total national population (INE, 2002)– infrastructures and services are also concentrated in those geographical areas. As expected, the reality for DRM and DRR is not any different. According to a study titled *Analysis of Disaster Risk in Chile* (UNESCO et al., 2012), regional disparities in terms of development of infrastructure for transport and communication, economic distribution and production capacities, and access to services and power reveal uneven levels of disaster risk throughout the country with those who live distant from urban centres and Central Chile being more at risk. This will be discussed in section 4.3.

**Figure 4.5. Administrative division by regions, provinces and municipalities, Chile**




*Source: elaborated by the author (2017)*

To offer a finer and multi-scalar analysis of the model of the DRM and DRR in Chile in the next sections, especially of the ONEMI –a government body and the major state effort on civil protection– I further explore the territorial structure of the state by explaining the organisation of the government at different territorial levels.

Administratively speaking, the government of Chile is organised, in reference to Figure 4.5, by institutions whose jurisdiction is limited by the political-administrative spatial boundaries: regional government, provincial government, and communal government or municipality. Financially speaking, only municipalities are entitled to generate revenues through a special municipal tax system which includes real estate tax, vehicle registration and road taxes, as well as street cleaning and maintenance taxes (SII, 2016). Financial and spending patterns in DRM and DRR in Chile are briefly addressed at the end of section 4.4.3.

*Regional government and the Intendente*

Regional governments are public bodies for the management of regions, tasked with their social, cultural and economic development. Currently, there are 15 regional governments in Chile. They are based in the capital city of the region and composed of two bodies: the *Intendente*, who is directly appointed by the President of the Republic and remains in office as long as he or she has the confidence of the President; and the Regional Council, a group of councillors that since 2014 have been elected by popular vote, being in office for four years (Ministerio del Interior y Seguridad Pública, 2013a).

Nonetheless, according to the Decree with Force of Law (DFL) N°19175 of 2005 (Ministerio del Interior y Seguridad Pública, 2005), the governmental power of each region rests solely with the *Intendente* as a natural and immediate representative of the executive power, and the regional councils merely serve as consultative bodies. So, on the one hand, regional councils have limited power to decide actions in respect of key state functions such as civil protection, and in relation to DRM functions and DRR actions, and on the other hand, *intendentes* depend on the executive power to decide and take actions in respect of civil protection. Furthermore, the legal functions of regional governments regarding civil protection interweave with those of national authorities competent in those areas, such as the ONEMI. The territorial planning instrument recently created in 2011, named

'Regional Plan for Territorial Planning' or PROT,[13] aims that regional governments implement DRM or DRR measures independently. However, like regional councils, PROTs are merely consultative instruments which give guidance for the development of the regions but are not binding plans. During the fieldwork, according to an executive of the National Subsecretariat for Regional Development and Administration (SUBDERE)[14] interviewed in July 2013, "no region has handed its PROT to the SUBDERE yet" (Carlos Villalobos,[15] male, National government director, July 2013, interview). It seems that although SUBDERE requested PROTs for each region by 2011, there is a notorious delay or lack of interest from regions in harnessing these plans to provide regions with more precise and locally pertinent DRM and DRR. I think that the potentials and opportunities of PROTs are constrained by the facts that PROTs are not binding, that the resources to prepare and implement actions need to be covered by regional funds, and that there is a lack of horizontal decentralisation in terms of decision-making over the functions of the state in DRM and DRR. I will return to PROTs when I conduct a closer analysis of key territorial planning instruments (IPTs) in section 4.4.3.

*Provincial government and Governor*

There are 53 provincial governments in Chile. According to the DFL N° 19175 (Ministerio del Interior y Seguridad Pública, 2005), provincial governments are decentralised figures of the *Intendente* within the regional territory, headed by a Governor. Provincial governors are responsible for public management and administration at the provincial level. Governors supervise all public services created by law. Similarly, governors may appoint delegates to exercise governor's will and powers in one or more locations in the province. Although governors are trusted by *intendentes*, they are appointed and removed freely by the President of the

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[13] In Spanish, *Plan Regional de Ordenamiento Territorial*.

[14] In Spanish, *Subsecretaría de Desarrollo Regional y Administrativo*.

[15] Fictitious name. As introduced in Chapter Two, for ethical reasons (confidentiality and anonymity), I decided that all interviewees' names would be replaced by fictitious ones, whilst gender, institutional affiliation, position and date of interaction is provided.

Republic. A Governor performs his or her duties in the capital city of their respective province, notwithstanding that he or she may exercise them temporarily from another city in its jurisdictional territory, especially in case of disaster or emergency. Provincial governors report directly to *intendentes*, while *intendentes* report directly to the President of the Republic. By 'reporting', I mean that such authorities are accountable and owe allegiance to a hierarchical political structure. This has important implications for DRM and DRR, because the ONEMI's Civil Protection Committee (CPC) and Emergency Operation Centre (COE) must always be headed by their respective territorial authority: the President of the Republic heads the national COE (in case of disaster) and the Ministry of Interior the national CPC; *intendentes* head regional CPC and COE, governors head provincial CPC and COE, and mayors head communal CPC and COE (Ministerio del Interior y Seguridad Pública, 2002). As an example of the vertical territorial relationship in terms of civil protection, the law that ascertains the functions of the provincial governments declares:

> "Provincial governments should take all necessary measures to face emergency or disaster, according to law, and develop programmes for disaster prevention and protection, without prejudice to the powers of the competent national authorities".
>
> (Ministerio del Interior y Seguridad Pública, 2005, Chapter II, Letter F)

This means that the law allows provincial governments to take DRM and DRR action yet it restricts those actions to the domains of national powers. During the fieldwork, I observed that civil protection –preparedness and prevention– in Los Lagos Region and Chaitén were mainly commanded by the ONEMI from Santiago, although executed later by regional and municipal authorities. A provincial authority interviewed in July 2013 confirmed that in terms of DRM and DRR:

> "We receive instructions from Santiago [ONEMI] in terms of guidelines, procedures, and personnel [...] the programmes to be prepared, and to ensure prevention too".
>
> (Pablo Benavente, male, Regional government director, July 2013, interview)

I also interviewed an ONEMI's delegate working at the Provincial Government of Palena, Rosa Miranda, who confirms that provincial government is limited to receiving instructions from ONEMI's regional and national authorities in terms of DRM and DRR. Again, as in the regional governments, I think there is a clear hierarchical, vertical, top-down relationship among the various territorial governments in terms of DRM and DRR. To some extent, this relationship is apparently defined by the law, especially the DFL No. 19175, however, it is also backed up by the historical processes that defined such relations: the retraction of decentralising forces in the past, and the vertical decentralisation (Montecinos, 2005) in recent decades. But beyond the origins of such centralisation, the subsequent question is, 'what' are the effects on the model of DRM and DRR in Chile? This is something I will try to address from section 4.4 onwards.

*Municipalities*

In Chile, municipalities are 'autonomous public bodies' responsible for meeting the needs of the local community and ensuring their participation in the economic progress, social and cultural development of the community (Ministerio del Interior y Seguridad Pública, 2005). Unlike *intendentes* and provincial governors, municipalities are ruled by a Mayor and a Municipal Council elected directly for a period of four years. Each municipality is advised by an Economic and Social Community Council (CESCO), composed of representatives from principal economic activities in the community, NGOs and neighbouring committees. Municipalities are responsible for basic education and health services in the community. Other functions, including civil protection, are defined by the Organic Constitutional Law on Municipalities. In this law, there is only one brief mention of DRM and DRR:

> "Paragraph No.2: Functions and Attributions: [...] i) The prevention of risks and delivery of relief in case of emergency or disasters".
>
> (Ministerio del Interior y Seguridad Pública, 2006, p.3)

Unfortunately, there is no further explanation about how this should happen and with what resources, nor a reference to other sets of rules or laws that could give more details about the role of municipalities in managing disasters and reducing risks. I consider this to be another indication of the reduced and limited role allocated to minor territorial levels in regard to disaster prevention and risk reduction.

Within the Chilean legal system, the 'urban' category can be applied at the municipal or community level when a settlement of 5,000 or more inhabitants is defined (Ministerio del Interior y Seguridad Pública, 2006). In that case, a settlement would then be bestowed along with the title 'city'. The urban category has significant and far-reaching implications for civil protection in terms of resources allocated based on the Cost-Benefit Analysis (CBA) carried out by the ONEMI and the territorial governments. According to an ONEMI's official interviewed in March 2013, medium and large urban areas are of high interest for the ONEMI, as they combine critical infrastructure and density of people and assets:

> "The concentration of assets such as urban infrastructure and population, parks, streets is going to influence the result of cost-benefit analysis made for DRR measures [...] mitigatory measures such as flood protection, or the river courses cleaning and maintenance are often subject to this cost-benefit analysis".
>
> (Rafael Montenegro, male, National government official, March 2013, interview)

By means of a CBA, it is possible to estimate the best alternatives to optimise the use of resources in reducing risks and disasters at the local level, however, the allocation of resources to specific DRR strategies or projects is not in the hands of municipalities but those of regional governments and the Ministry of Interior, which in turn, depend on the President of the Republic (Ministerio del Interior y Seguridad Pública, 2002, 2006). Again, we find that although municipalities could own certain

functions and attributions in respect to DRM and DRR, in practice, decision-making is subordinate to the executive central power.

Now, we move to an often ignored aspect within the historic development of the state territorial organisation of Chile, and of relevance for the study of post-disaster Chaitén: the uneven development among regions and territories in Chile. This deserves attention because it may help to explain why there are important disparities among territories in terms of risks and vulnerabilities, as was documented by UNESCO et al. (2012) and other literature (Atienza and Aroca, 2012; Cooper and Henriquez, 2010; Olavarria-Gambi, 2003; Schurman, 1996).

### 4.3 Economic model, centralisation and uneven development

Soto and Torche (2004) pointed out that the Chilean per capita gross domestic product (GDP) grew by approximately five per cent annually between 1975 and 2000, but regions did not benefit equally from this growth: "poverty declined significantly in all regions but regional income inequality remained stagnant" (Soto and Torche, 2004, p.401).

Some researchers assert that this income inequality and uneven development of the country have been the result of neoliberal reforms (Ferrada Borquez, 2000; Solimano, 2012; Soto and Torche, 2004). After the *coup d'état* on September 11, 1973 as led by the General Commander Augusto Pinochet against the elected government of Salvador Allende, substantial neoliberal reforms were implemented (Solimano, 2012) which were consolidated within the Constitution of 1980 (Ferrada Borquez, 2000). Such reforms were characterised by an aggressive strategy of privatisation and market liberalisation, which included the privatisation of basic social services such as health, education and pensions, trade opening, and deregulation (Klein, 2008; Solimano 2012). Although these neoliberal reforms had the intention of reinvigorating the Chilean economy, they produced significant regional disparities and social inequality (Quitral Rojas, 2009). According to Solimano (2012), after 20 years of left-wing governments –from 1990 to 2010– the

implemented neoliberal reforms in the past have not been counterbalance or neutralised, on the contrary, in some cases, they have been deepened: more trade opening, and progressive withdrawal of the state role on pensions (Solimano, 2012) and on emergency response and reconstruction (Pulgar Pinaud, 2014b; Sandoval and González-Muzzio, 2015).

Several studies and researchers (Quitral Rojas, 2009; Soto and Torche, 2004) assert that neoliberal reforms have also promoted social, economic and political centralisation. This centralisation –reflected in the city of Santiago, where the wealth and one third of the national population is concentrated– has produced uneven development in the rest of Chile. Just in terms of GDP, the Santiago Metropolitan Region (SMR) contributed almost half of the national GDP (see Table 4.5). In terms of population, accessibility to public services and employment, the tendency is strikingly similar. Job opportunities, educational quality, access to institutions and a wide range of services are concentrated in Santiago as in no other city or region in Chile (BNE, 2014; CNA-Chile, 2016).

**Table 4.5. Regional GDP participation in percentages of national GDP**

| Region | 1980–82 | 1990–92 | 2002–04 | 2003–06 | 2007–09 |
|---|---|---|---|---|---|
| I Tarapacá | 3.2 | 3.0 | 3.5 | 3.9 | 4.0 |
| II Antofagasta | 6 | 6 | 8 | 7.5 | 6.9 |
| III Atacama | 2 | 2 | 2 | 1.9 | 2.0 |
| IV Coquimbo | 2 | 2 | 2 | 2.5 | 2.5 |
| V Valparaíso | 11 | 10 | 9 | 8.9 | 8.7 |
| RM Santiago | 47 | 49 | 48 | 46.8 | 48.2 |
| VI O'Higgins | 5 | 5 | 5 | 4.1 | 4.0 |
| VII Maule | 3 | 4 | 4 | 3.9 | 3.8 |
| VIII Biobío | 12 | 11 | 10 | 10.4 | 10.1 |
| IX La Araucanía | 3 | 3 | 3 | 2.6 | 2.7 |
| X Los Lagos | 4 | 5 | 5 | 5.0 | 4.9 |
| XI Aysén | 1 | 1 | 1 | 0.7 | 0.7 |
| XII Magallanes | 2 | 2 | 1 | 1.7 | 1.4 |
| **Total National GDP %** | **100** | **100** | **100** | **100** | **100** |
| GDP per capita | 5,092 | 6,487 | 10,409 | 11,386 | 12,222 |

*Compiled by the author (2017), based on Banco Central (1984, 1993, 2007, 2011) and World Bank (2016)*

According to Riffo (2007), although most of the national concentration in economic, political and demographic terms occurred in the SMR, some regions reached economic growth mainly due to the exploitation of raw materials such as copper (Northern Chile), wood (South-Central Chile), and fishing (Southern Chile). As Table 4.5 shows, however, this economic growth has not necessarily translated into a reduction in centralisation. In general, the contribution of regions to the national GDP shows very little variation between 1980 and 2009. Although there are other figures that can be used to demonstrate this view, the point here is to discuss whether the territorial/scalar structure of the state has predisposed the uneven development of territories and, if that is the case, what the repercussions are of this uneven development for the production of vulnerability and risks.

It is equally important to mention here the role of the SUBDERE, being the major state effort to counteract centralisation and to balance the development of regions. SUBDERE is responsible for coordinating, promoting and evaluating decentralisation and regional development. Established in 1984, SUBDERE aims to contribute to municipal and regional development, promoting capacity building and giving coherence to the country's decentralisation processes. SUBDERE controls one of the primary funding sources for regional and local governments, the National Fund for Regional Development, or FNDR (OECD, 2013). Another similar instrument managed by SUBDERE is the Municipal Common Fund, or FCM, a distributive tool that aims to equalise income disparities between municipalities throughout the country. Despite the intentions of SUBDERE and these mechanisms, Boisier (2000) asserts that SUBDERE in general, and the FNDR in particular, have caused more centralisation and reinforced inequality. The FNDR used to be a "reinvestment budget where five per cent of the regional GDP must be used within each region"; however, this idea was abandoned by the central government because it may produce "budgetary rigidity" at the national level (Boisier, 2000, pp.93-94). In other words, it would have reduced the capacity and power of the national government to control and decide such budgets (Boisier, 2000). Today, most of the orders and decisions related to FNDR and FCM are taken from and directed by Santiago, by

ministries and inter-ministerial committees which secure the execution of their sectorial projects, generally overriding regional priorities and interests (Pressacco, 2009). In March 2013, I interviewed an official from the regional government of Los Lagos, who referred to this issue:

> "FNDR projects are great instruments for development; the problem is that those projects must always be aligned with national priorities, and often regional needs are far from those [...] moreover, the decision-making occurs in Santiago, with national authorities or a committee of experts that reports to the same national authorities".
>
> (Javier Martinez, male, Regional government official, March 2013, interview)

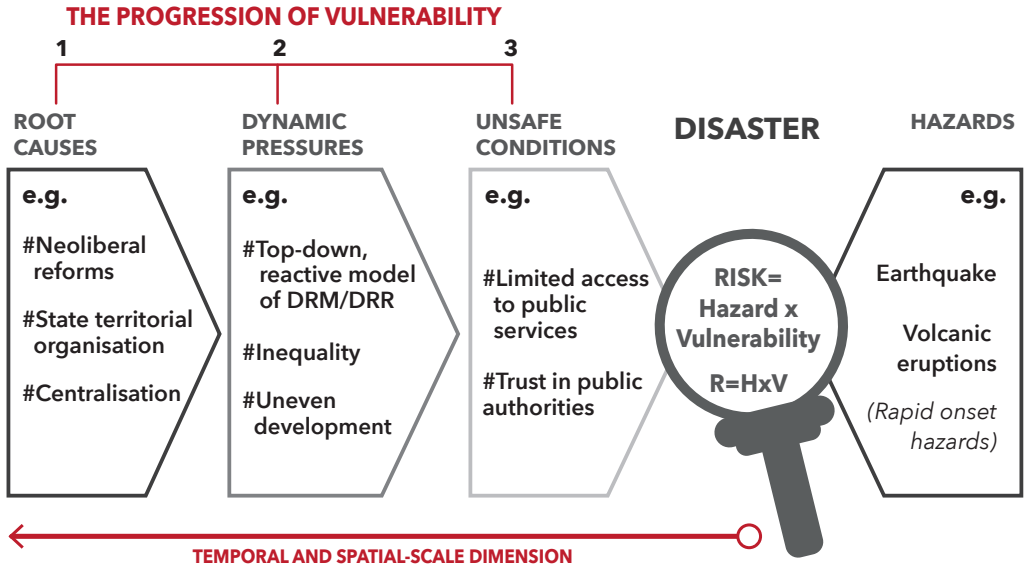
This reflects that regional developmental tools such as the FNDR are indeed aligning regions to the national development strategy, being national authorities who decide both national and regional plans. From this perspective, it seems that top-down structure could have some effects on regional and local civil protection plans, as the priorities and needs of each region and city differ. I explore some unforeseen effects of this top-down approach in the case of post-disaster Chaitén in the next chapter.

Montecinos (2005) and Pressacco (2009) agree that decentralisation processes are rather scarce and some landmarks, such as the creation of regional councils in 2014, and some progress on fiscal matters need mentioning. But again, the expected decentralisation is only administrative rather than at the political and economic levels. One variable, observed by Atienza and Aroca (2012), places emphasis on the fact that the "excessive centralisation" of the SMR has negatively affected the spatial inequality in terms of an "uneven distribution of production, employment and population throughout the country" (Atienza and Aroca, 2012, p.263). Moreover, Atienza and Aroca (2012) and Soto and Torche (2004) agree in asserting that public policies have tended to systematically ignore spatial inequality, which is an illustrative example of the failure of SUBDERE's objectives in reducing the negative impacts of centralisation (Mac-Clure and Calvo, 2013).

Likewise, inequality has been systematically associated with neoliberalism, because deregulation policies, tax liberalisation and the privatisation of public services have, on the one hand, tended to concentrate economic and political power in few hands and elites (Harvey, 2005) and, on the other hand, have exacerbated marginalisation and the impoverishment of social groups (Solimano, 2012). Economically powerful communities and regions in Chile, such as Santiago, externalise risks onto poorer and less powerful populations by establishing an uneven development in a variety of ways. For instance, housing and land market liberalisation have limited access to safer areas to the rich, while less powerful groups are restricted to areas with limited access to opportunities –i.e. jobs, health and education– or access only to disaster-prone ones (Lees et al., 2015). Furthermore, neoliberal institutional arrangements have allowed powerful economic elites to establish new enrichment sources, such as those from reconstruction projects (Gonzalez-Muzzio and Sandoval, 2014). Previously, different researchers (Collier, 2013; Gunewardena and Schuller, 2008) have attempted to connect neoliberalism and disasters. In Chile, some researchers (González-Muzzio and Sandoval, 2014; Pulgar Pinaud, 2014a, 2014b) have questioned reconstruction processes that are highly influenced by the growing participation of the private sector.

Finally, as presented throughout last two sections, the logic of the state territorial organisation of Chile can be properly understood under the rationale of economic development and geopolitical interest. The concentration of political power and economy, neoliberal policies, and patterns of uneven development among regions are apparently intertwined in the case of Chile (Atienza and Aroca, 2012; Boisier, 2000, 2001; Pressacco, 2009; Riffo, 2007; Soto and Torche, 2004). Therefore, an exploration of the potential implications of such processes –i.e. models of territorial organisation of the state, processes of centralisation and decentralisation, and neoliberal reforms– for the model of DRM and DRR, and therefore for the production of vulnerability and risks, becomes very important. In other words, the root causes of disasters and risks may be found in those macro processes which initiate the path to the materialisation of disaster vulnerability and unsafe conditions.

**Figure 4.6. Potential links between root causes and unsafe conditions in Chaitén**



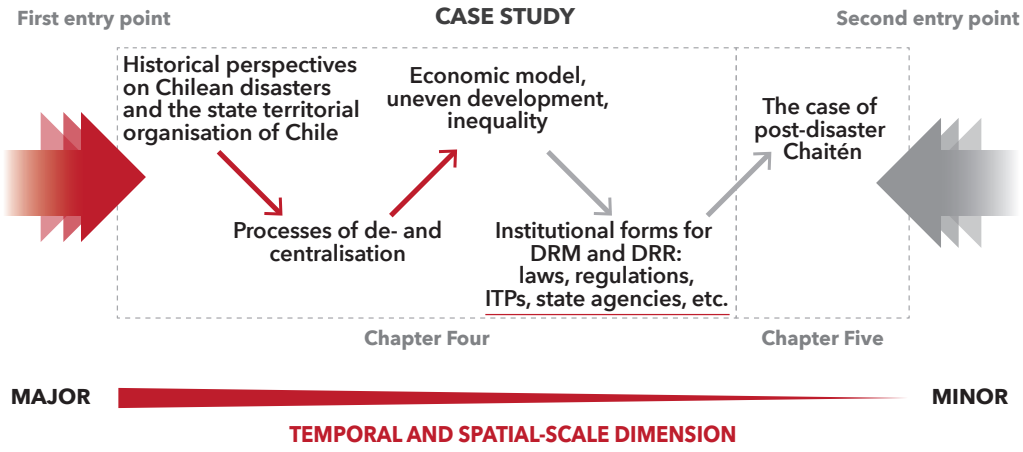

*Source: elaborated by the author (2017)*

In Figure 4.6, I hypothesise about potential connections within the progression of vulnerability that are not yet evident. These seek to formulate trajectories to be explored and elements that should be further investigated in the case of Chaitén – for instance, how the territorial structure of the state and its scalar configuration (its centrality) may have affected the scalar organisation of DRM and DRR and why, and ultimately, how policy responses to disasters and the model of disaster risk reduction may have facilitated the materialisation of unsafe conditions in Chaitén. The next figure tries to explain the trajectories I have chosen to take the reader to this point.

Figure 4.7 shows, as in the introduction, that the case study is investigated from two entry points. The first occurs within this chapter, in which I look at the major historical processes related to the context of Chile, and from a multi-scalar perspective. The second entry point will take place in Chapter Five. Alongside with post-disaster Chaitén itself, the idea of this second entry point is to investigate the same elements discussed in this chapter but from the bottom up, from the local and particular unsafe conditions in Chaitén, connecting the relationships with root causes and

dynamic pressures on a major scale. Figure 4.7 also shows the direction where we now head. The next section analyses the Chilean model of governing disasters and risks, considering the mainstream narrative of the history of Chilean disasters and the country's centralised and top-down state territorial organisation.

**Figure 4.7. Rationale for the case study's chapter, entry point and progress**




## 4.4 The model of managing disasters and reducing risks in Chile

Having reflected on the state territorial organisation of Chile and its scalar configurations, here I examine how the model of DRM and DRR, and other institutional forms, is defined, organised and distributed within such multi-scalar territorial organisation. This part of the text aims to discuss the influence that the territorial structure of the state has on the DRM and DRR models in Chile. This is the case as other institutional forms such as in education –e.g. ministries, regional departments, schools and so forth– are often geographically distributed and hierarchically organised in accordance with a specific form of state territorial organisation (Clark, 2014) –e.g. centralist and federalist. In other words, government institutions tend to mirror or reproduce the form of the territorial structure of the state.

DRM and DRR institutional forms such as the ONEMI are crucial for reducing risks and developing DRR within a wide range of other institutions –including those from

civil society, the private sector and the population– in order to monitor natural and man-made hazards, to reduce exposure and vulnerability, to develop preparedness and to promote resilience (UNISDR, 2013). Thus, the connection between territorial organisation, particularly centralisation, and the institutional model of managing risks and disasters deserves to be investigated, as this connection may have implications for the production and progression of vulnerability, risks and disaster causation.

I start this examination with what is perhaps the more relevant institutional form of DRM and DRR in Chile, the National Emergency Office (ONEMI) of the Ministry of Interior and Public Security. Thereafter, other relevant forms such as legal frameworks and planning instruments will be examined.

### 4.4.1 The National Plan of Civil Protection and the ONEMI

In Chile, as in other countries, the building, consolidation and updating of regulatory and institutional frameworks on DRM and DRR came about as fallout from large disastrous events. For example, the 1928 Talca earthquake advanced the creation of the first Law on Urban Planning and Construction; the 1939 Chillán earthquake provided the basis for earthquake-resistant construction standards called the Chilean Standard for Seismic Design of Buildings N°429 (NCh429)[16] and NCh430; the 1960 Valdivia earthquake and *tsunami* gave rise to the National Emergency Office (ONEMI); and the 1985 Central Chile earthquake further strengthened the existing standard of earthquake-resistant buildings, as enforced in the NCh433 code. Recently, the effects of the 2010 Maule earthquake and *tsunami* initiated the reformulation of the ONEMI into a new National System of Civil Protection and Emergency Plan, and the creation of a new National Agency of Civil Protection[17] (ONEMI, 2011).

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[16] In Spanish, *Diseño Sísmico de Edificios: Norma Chilena Oficial N°429*.

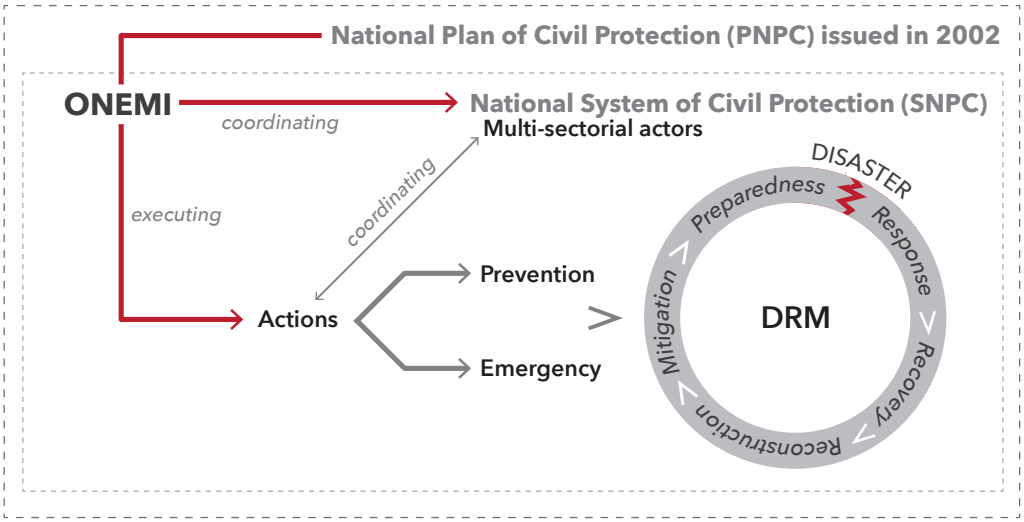
[17] This plan and the creation of the agency were presented as a bill by the President of the Republic to the Congress by late 2011. Even though its status has been declared as an 'urgent law' (Senado de la República de Chile, 2014), its discussion and approval remain delayed to date (2016–17).

In 2002, Supreme Decree (DS) Nº156 (Ministerio del Interior y Seguridad Pública, 2002) established the current National Plan of Civil Protection, or *Plan Nacional de Protección Civil* (PNPC), which represented the first institutional effort that explicitly sought to address issues of risk reduction holistically, as it considered for first time the pre-existing conditions of a disaster such as preparedness and mitigation.

Although initially created only for emergency management in 1974 by DS Nº369 (Ministerio del Interior y Seguridad Pública, 1974), the ONEMI today is the primary technical agency of the state responsible for executing the PNPC and coordinating the National System of Civil Protection, or *Sistema Nacional de Protección Civil* (SNPC) (Ministerio del Interior y Seguridad Pública, 2002). ONEMI's mission is to plan, promote, coordinate and implement preventive actions, responses and rehabilitation in the face of collective risk situations, emergencies and disasters caused by natural or human action (ONEMI, 2017). ONEMI's authorities report to, and depend directly on, the Ministry of Interior and Public Security. The first plan was called the National Emergency Plan and it was issued in 1977, approved by DS Nº155. The current PNPC was approved by DS Nº156 in March 2002, and it dictates the norms of the organisational and administrative structure of the SNPC (Ministerio del Interior y Seguridad Pública, 2002), including the ONEMI. This plan is intended to be multi-sectorial and is dedicated to the development of permanent actions for the prevention and treatment of emergencies and disasters from a cyclical view of disaster management (Figure 4.8).

Figure 4.8 shows that the PNPC sets the ground rules for how the management of the SNPC is coordinated by the ONEMI. This diagram also depicts the importance and centrality of the ONEMI within the PNPC and the SNPC, which role has major relevance for this thesis as it considers the ONEMI as the main public and national effort for the reduction of disaster risks and response.

**Figure 4.8. Relations between the PNPC, SNPC and ONEMI, and their functions**




*Source: elaborated by the author (2017)*

As established by the PNPC (Ministerio del Interior y Seguridad Pública, 2002), the system of civil protection needs to be applied both nationally and at the regional, provincial and municipal levels. It is managed and coordinated respectively by regional and provincial governments and municipalities through the ONEMI. Each of these governance institutions is supposed to maintain and adapt its organisational and operational structures to meet the roles and functions assigned according to the PNPC whilst maintaining its aims and jurisdictional autonomy (Ministerio del Interior y Seguridad Pública, 2002).

According to the PNPC guidelines, each territorial administrative level must have a Civil Protection Committee, or CPC, comprising national, regional, provincial and communal committees. Each CPC must internally elaborate a plan to implement prevention, mitigation and preparedness actions in relation to DRM and DRR, seeking to reflect the particular realities of each jurisdictional area. CPCs comprise representatives from the public and private sectors, and their composition varies according to the territorial level they represent. In some localities, such as Chaitén, CPCs hardly meet to design or implement DRM and DRR strategies for several reasons, including restricted financial resources and doubling up of functions

among public agents that restricts their availability to participate in meetings and to work on designing and implementing plans.[18]

Equally important is the financial distribution of the implementation costs of each plan. The PNPC establishes that the cost of executing will be covered by each of the ministries, regional and provincial administrations, and municipalities using their own resources (Ministerio del Interior y Seguridad Pública, 2002). This embodies the contradiction that, on the one hand, decision-making and authority command are centralised at the national level, but, on the other, the funding of projects or strategies must often come from local sources. This way of organising civil protection committees and DRR can create conflicts between national and local public authorities as their demands and interests are not always attended to.[19] Furthermore, this hierarchical and interventionist approach can have negative results for the development of crucial aspects of DRM such as preparedness and prevention (Scolobig et al., 2015), as they require the real involvement of people and local actors —not just consultative.

In addition, despite the declaration of the PNPC regarding preparedness and mitigation, the ONEMI has tended to focus mainly on emergency management and response, perhaps as a continuation of its legacy from its initial structure in 1974. The first indication of this is the level of attention paid, and the detail of descriptions given within DS N°156, to emergency issues rather than to prevention and preparedness. A quick text analysis of DS N°156 will show that the word 'emergency' is used twice as often as the phrases 'risk reduction', 'prevention' and 'preparedness' combined (Ministerio del Interior y Seguridad Pública, 2002). Other indications of this orientation towards emergencies and response will be explored through the analysis of other institutional forms, such as legal frameworks.

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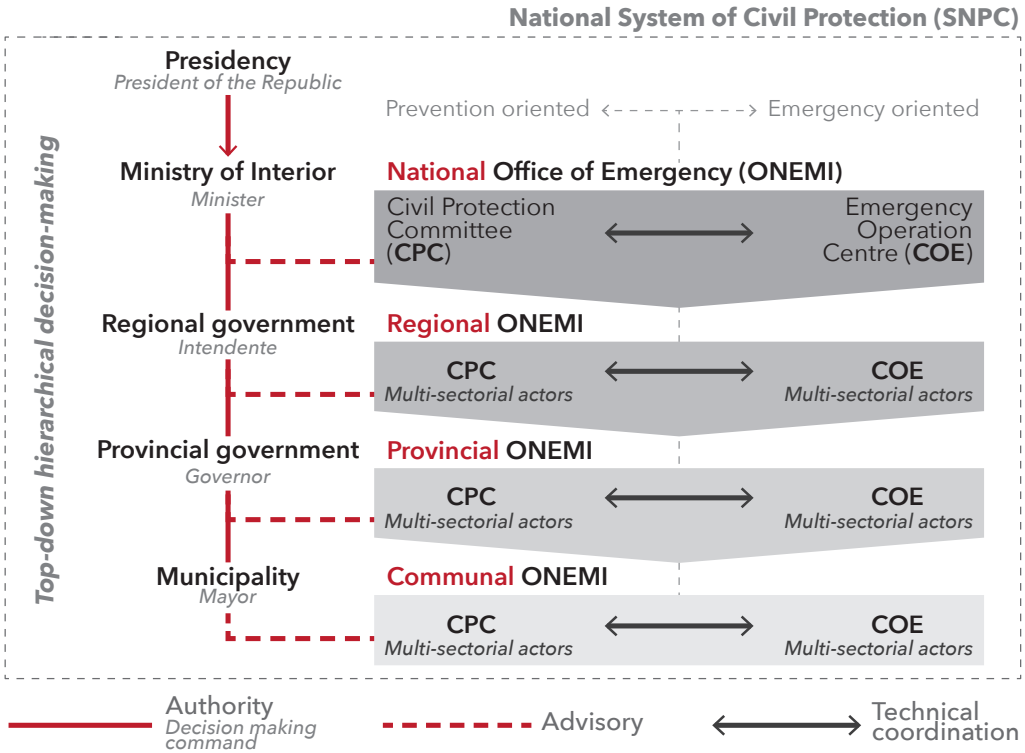
[18] During the fieldwork, I observed that Chaitén lacked an updated municipal emergency plan (MEP). The current MEP was elaborated in 2010. MEPs should be elaborated by the communal CPC yearly.

[19] See again what Javier Martinez, from the Regional government, says on page 152.

During disasters and emergencies, the ONEMI constitutes temporary Emergency Operation Centres, or *Centros de Operaciones de Emergencia* (COEs), depending on which territorial level a given event has affected. COEs are organised at each level of the political-administrative order and they are responsible for coordinating decisions and actions within the response, relief and rehabilitation. These centres are headed by representatives of territorial governments that are part of CPCs: the President of the Republic and Minister of Interior, the *Intendente*, the Governor and the Mayor respectively. Operationally speaking, CPCs are constituted before a disaster occurs, while COEs operate during emergencies and often during post-disaster phases. In addition to government authorities, CPCs and COEs must integrate actors from the private sector and civil society depending on their expertise and relevance for the DRM and DRR plans. These actors, however, only act as technical advisors within the committees and centres: thus the decision-making hierarchy remains intact (see Figure 4.9).

**Figure 4.9. Structure of the National System of Civil Protection (SNPC) and ONEMI's role**




*Source: elaborated by the author (2017), based on ONEMI (2002)*

Figure 4.9 reflects the top-down hierarchical organisation of the decision-making process within the ONEMI and the system of civil protection. In a document requested by the Council for Transparency in 2013,[20] I found that, officially, the command hierarchy within the SNPC and ONEMI is at first political in nature, then administrative, and lastly technical, being the highest level of national authority concentrating the power to decide and prioritise DRM and DRR actions.

> "The concept of command hierarchy operates according to the SNPC [...] First, a) Command of Authority: rooted in territorial authorities (President of the Republic and Minister of the Ministry of Interior, *Intendente*, Governor, and Mayor). b) Command of Coordination: rooted in Directors of Civil Protection and Emergency. c) Technical Command: Linked to an organisation or sector specialised in specific emergency events".
>
> (Ministerio del Interior y Seguridad Pública, 2013b)

From this document, it seems that the distribution and hierarchical organisation of the ONEMI tend to replicate or mirror the verticality of the state territorial organisation of Chile. This document, and its fellow constituting the PNPC (Ministerio del Interior y Seguridad Pública, 2002), are used here to underline the systemic top-down orientation of the civil protection system and the ONEMI. The question is, nevertheless, about the repercussions of this top-down approach for the progression of vulnerability. The idea then is to explore and look at the consequences of this vertical structure. To do so, it is necessary to turn to the case of Chaitén. However, there are other DRM and DRR institutional forms, such as legal frameworks and territorial planning instruments (IPTs), that can play a role. These are examined in order.

### 4.4.2 Legal frameworks for DRM and DRR

Other relevant elements of the model of DRM and DRR are the planning instruments and legal frameworks –e.g. laws, decrees. These aim to support and guide authorities and practitioners during the process of decision-making in emergencies and post-disaster phases, but also to control disaster risk reduction. For instance,

[20] When there are government documents that are not available in the public domain, a citizen can request such documents from the Council for Transparency (Portal de Transparencia, 2013).

legal frameworks such as building codes become indispensable in creating better hazard management and risk reduction (UNISDR, 2013, 2015a). But what they can tell us about the scalar configuration of the model of DRM? To interrogate the wide range of documents, I used the document analysis technique described in Chapter Two (see pages 68-70). The document sampling was based on representativeness among the existing documents, and meaning. For the latter, I used the categories of 'national security', 'civil protection', 'emergencies' and 'disasters' in the online database of the National Congress Library (BCN, 2017). Finally, I selected 30 legal documents based on their relevance to describe the model of managing disasters and reducing risks in different territorial tiers, and I organised them in three categories:

- Structural legal frameworks: laws or systems of laws (e.g. organic laws) and documents that transversally help to describe the legal structure of the model of DRM and DRR.
- Regulations/post-disaster laws: legal documents on policy responses to disasters. Specific regulations related to emergency situations and states of catastrophe.
- Sets of rules/prevention laws: legal documents and sets of rules such as codes and standards related to the prevention and reduction of hazards and risks.

In the following tables, I analyse each document by extracting their main aspects in the form of observations. I classified them in terms of their vertical/hierarchical position vis-à-vis the territorial structure of the state, and its orientation within the DRM cycle. Table 4.6 analyses different laws and the Constitution of Chile, which define and structure the National System of Civil Protection.

**Table 4.6. Legal structure of the National System of Civil Protection in Chile**

| Law | Observations | Hierarchy | Orientation |
|---|---|---|---|
| The Constitution of the Republic of Chile (Government of Chile, 1980). | Article N°1 establishes that is the duty of the state to safeguard the national security and protect the population.<br>Articles N°39 and N°40 regulate the State of Constitutional Exception* (in German, *Ausnahmezustand*) in the form of the 'State of Catastrophe' which can be declared by the President of the Republic in agreement with the National Security Council but only in the case of a 'public calamity'. | National | Emergency response, prevention |
| DS N°7912 on the Constitutional Law of Ministries (Ministerio del Interior y Seguridad Pública, 1927). | This law assigns to the Ministry of Interior everything related to the maintenance of public safety, harmony and public order. | National | Emergency response |
| Law N°16282 in cases of Earthquakes and Catastrophes, reused from DS N°104 (Ministerio de Hacienda, 1965a). | Article N°21 establishes that the Ministry of Interior is responsible for the planning and coordination of all activities related to the response during an earthquake or catastrophe.<br>In case of catastrophes in a country other than Chile, this law also gives authority to the Ministry of Interior to gather support and deliver it abroad. | National | Emergency response |
| DL N°369 on the Constitutional Law of ONEMI (Ministerio del Interior y Seguridad Pública, 1974). | This law creates the ONEMI and its fundamental rules. It establishes the objectives of the ONEMI: to plan, coordinate and execute actions aimed to prevent and alleviate problems stemming from earthquakes or catastrophes.<br>The director of the ONEMI can declare a Situation of Emergency (in Spanish, *Situación de Emergencia*), which is different from 'State of Catastrophe' declared by the Ministry of Interior. | National | Emergency response, prevention |
| DS N°509 (Ministerio del Interior y Seguridad Pública, 1983) | This law establishes new fundamental rules for the ONEMI's functioning by creating the first Regional, Provincial and Communal Committees of Emergency as permanent working bodies. Likewise, this law creates the Emergency Operation Centres (COEs). | National, regional, provincial, communal | Emergency response |
| DS N°155 on the National Emergency Plan (Ministerio del Interior y Seguridad Pública, 1977). | This law approves the creation of the National Emergency Plan which establishes the actions and tasks to be executed during an emergency. This law also encourages *intendentes*, governors and mayors to create their own territorial emergency plans. This is the predecessor to MEPs (Municipal Emergency Plans). | National, regional, provincial, communal | Emergency response, preparedness |

| Law | Observations | Hierarchy | Orientation |
|---|---|---|---|
| Law N°19175 reused from DS N°291 (MIDEPLAN, 1992). | Constitutional Law for Government and Regional Administration. Articles N°20 and N°40 grant *intendentes*, governors and mayors the right to adopt measures to prevent and deal with emergencies and disasters. Likewise, regional governments have the right to take measures to address emergencies or disasters in accordance with the law, and to develop disaster prevention and protection programmes without being subjected to the powers of the authorised national authorities. | Regional, provincial, communal | Emergency response, prevention |
| Law N°18695 on the Constitutional Law of Municipalities, reused from DS N°662 (Ministerio del Interior y Seguridad Pública, 2006). | This law allows municipalities to develop and execute their own, or in partnership with other government institutions, actions for preparedness and risk prevention, and to provide relief in case of emergency. Article N°7 establishes that all these actions must be within national and regional frameworks on security and emergency plans. | Communal | Preparedness, prevention, emergency response |
| Law N°20444 on reconstruction (Ministerio de Hacienda, 2012a). | This law creates the National Reconstruction Fund (FNR) and sets the Incentive Mechanisms of Donation in case of Disaster. This establishes tax incentive mechanisms for donations to the FNR, which can be used in future post-disaster contexts. | National | Reconstructio n, recovery |
| DS N°38 amends DS N°156 from 2002 and creates Civil Protection Committee (Ministerio del Interior y Seguridad Pública, 2002). | Creates the National, Regional, Provincial and Communal Civil Protection Committees (CPCs) with the ability to make decisions and take actions in the areas affected by the emergency. | Regional, provincial, communal | Preparedness, prevention |

*Compiled by the author (2017)*
** The 'State of Exception' is a concept in the legal theory of Giorgio Agamben (2008)*

Table 4.7 below displays specific regulations related to emergency situations and states of catastrophe. This table distinguishes regulations purposed for disaster response and relief from those which are oriented towards compensatory measures during recovery and reconstruction processes, as well as those regulations regarding budgeting.

**Table 4.7. Other regulations related to DRM and DRR in Chile**

| Law/set of rules | Observations | Hierarchy | Orientation |
|---|---|---|---|
| DS N°733 (Ministerio del Interior y Seguridad Pública, 1982). | This law establishes that the Ministry of Agriculture, particularly the National Forest Corporation (CONAF), is the responsible body for the prevention of and response to wildfires. | National | Emergency response, prevention |
| Decree-law (DL) N°2222 on the Navigation Law (Ministerio de Defensa, 1978) | Title N°9 addresses regulations regarding oil spill pollution and other pollutants. The General Directorate of Maritime Territory and Merchant Marine, Chilean Navy, is responsible for the response. | National | Emergency response |
| DFL N°725 on the Sanitary Code (MINSAL, 1968) | Article N°114 contains regulations and instructions for national authorities and institutions in case of epidemics or emergencies that threaten the health or life of the population. | National | Emergency response |
| Law N°16250 on Public Security (Ministerio de Hacienda, 1965b). | This law establishes that *intendentes* (regional governors) and provincial governors can use vehicles and buildings owned by the state and semi-state institutions during a State of Catastrophe. | National | Emergency response |
| DS N°294 on the Ministry of Public Works (MOP, 1985). | DS N°294 gives special authority to the Ministry of Public Works to appoint direct contracts and execute the construction of critical infrastructures during emergencies. | National | Emergency response, relief |
| **Related to the delivery of benefits and compensatory measures** | | | |
| D.N°1 on Housing Subsidy, Acquisition and Selling, amended from DS N° 174 (MINVU, 2011). | Through this law, people affected by a catastrophe may apply for housing benefits where they could not apply under normal circumstances. | National | Relief |
| Law N°18910 on the INDAP (Ministerio de Agricultura, 1990). | The National Institute for Agricultural and Livestock Development (INDAP) is allowed to allocate resources and compensation measures to affected producers in case of catastrophe, as well as being allowed to attend emergencies in rural areas. | National | Relief, emergency response |
| Law N°18056 on Pensions (Min. del Interior y Seguridad Pública, 1994). | This law establishes that people affected by catastrophes may apply for special social pensions. | National | Relief |
| DS N°150 on Employment (Ministerio del Trabajo y Previsión Social, 1982). | This law establishes that people affected by catastrophes are able to receive unemployment benefits. | National | Relief |

| Related to budgeting and allocation of resources during emergencies | | | |
|---|---|---|---|
| The Constitution of the Republic of Chile (Government of Chile, 1980). | The President of the Republic has the right to release 'non-authorised payments' by the law (during normal times) in case of emergencies as established by the constitution. | National | Emergency response, relief |
| Programme of Transfers to Public Sector (Ministerio de Hacienda, 1965a). | In cases of catastrophe, the General Secretary and Administration is allowed to directly transfer resources from its own budget to other public entities and organisations. | National | Emergency response, relief |
| ONEMI by the Law of Government Budget (Ministerio de Interior y Seguridad Pública, 2002). | Via the Transfer to Private Sector item, ONEMI is allowed to transfer public resources to the private sector in cases of emergency. | National | Emergency response, relief |
| Regional and provincial governments, by Law N°19175 (Min. del Interior y Seguridad Pública, 1992). | According to the Goods and Consume Services item, regional authorities are allowed to (regionally) distribute support to combat emergency situations declared previously by the President of the Republic. | Regional | Emergency response |
| Local budget by the Law of Government Budget to Public Sector transfers (Ministerio de Hacienda, 2014). | Municipalities could channel transfers from the budget for the Programme for Urban Development and Communal Equipment to the private sector in emergency situations. These transfers must be approved by the Secretary of Regional Development and Administration and subsequently applied by the *Intendente*. Each year, the municipal budget should declare a certain amount of resources to be used for DRR, prevention, relief and response to emergencies. | Regional, communal | Emergency response, prevention, relief |

*Compiled by the author (2017)*

Finally, Table 4.8 below displays legal frameworks related to the prevention and reduction of impact of threats and hazards. These are differentiated from the previous legal frameworks because they consider specific actions and measures aimed to prevent disasters.

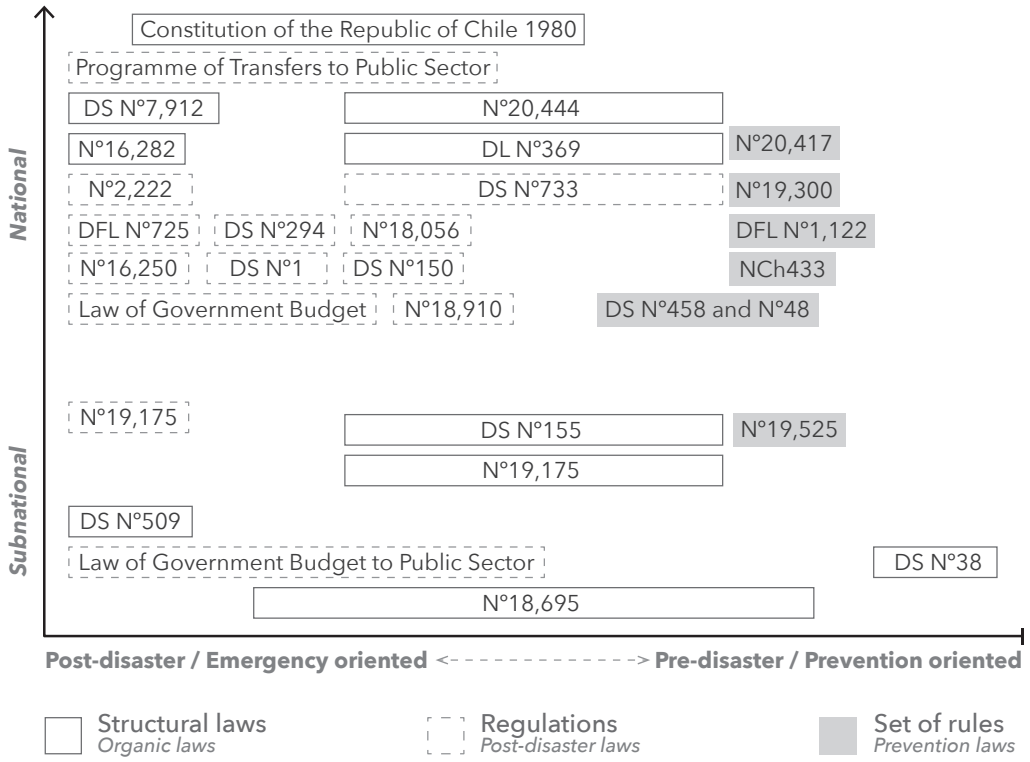
**Table 4.8. Legal frameworks on 'prevention' related to DRM and DRR in Chile**

| Law/set of rules | Observations | Hierarchy | Orientation |
|---|---|---|---|
| Law and General Ordinance of Urbanism and Construction, DS N°458 and N°48 (MINVU, 1976). | This law establishes the territorial planning instruments (IPTs) which require risk assessments. IPTs can, depending on the natural hazards, propose (so it is not a binding element) unbuildable or restricted areas. | National, regional, communal | Prevention, mitigation |
| Chilean Standard for Seismic Design of Buildings NCh433 from 1996 (INN, 1996). | NCh433 establishes minimum requirements for the seismic design of buildings and seismic requirements to be met by equipment and other secondary elements of buildings. It includes recommendations for the evaluation of seismic damage and repair. It also delimits the national territory by establishing differentiated design standards among regions. | National | Prevention |
| DFL N°1123 on the Water Code (MOP, 1981). | Regulates the use of water channels and user organisations of water resources, and establishes the standards for construction of waterworks. It entitles the Ministry of Public Works to monitor waterworks in natural water channels in order to prevent damage of defence mechanisms, flooding or increased risk of future flooding. It requires the development of mitigation works/ mechanisms. It also regulates the identification of droughts and the mitigation of their impact. | National | Prevention, mitigation |
| Law N°19525 by the Ministry of Public Works (MOP, 1997). | Regulates planning, policy development and the construction of rainwater evacuation systems in order to allow easy drainage and disposal, preventing the damage that floods may cause to people, housing and urban infrastructure. | Regional, provincial | Prevention, mitigation |
| Law N°19300 on Basis for Environment (Ministerio Secretaría General de la Presidencia, 1994). | This law dictates the requirement for certain infrastructure and projects derived from territorial planning instruments (IPTs) to be subject to a System of Environmental Impact Assessment (SEIA). Among other aspects, this law requests an Environmental Impact Assessment for large projects and it demands mitigation measures where danger exists. | National | Prevention, mitigation |
| Law N°20417 on the Basis of General Environmental Framework (Min. Secretaría General de la Presidencia, 2010). | This law ensures new environmental management tools for the administration of waste and contaminated soil, as well as for the tackling of climate change and the promotion and restoration of water resources and conservation of ecosystems, among other matters. | National | Prevention |

*Compiled by the author (2017)*

In order to reflect on legal frameworks from a more advantageous angle, I have arranged them in three subcategories in a Cartesian layout (see Figure 4.10): i) Regulations or laws oriented to post-disaster scenarios; ii) Sets of rules or frameworks oriented to preventive actions; and iii) Structural or organic laws, which are those that form sub-national governments and other bodies of rules, such as the national constitution.

**Figure 4.10. Map of the legal structure of the DRM and DRR model in Chile**




*Source: elaborated by the author (2017)*

The elements displayed in Figure 4.10 comprise the legal structure of DRM and DRR in Chile, and are arranged in vertical and horizontal axes. On the one hand, the vertical axis represents the territorial tier or scale on which a given element is positioned in terms of decision-making. For instance, it responds to questions such as which authority or institution has priority on decision-making, at what level, or who decides? This axis aims to reflect the hierarchical and territorial ordering of the legal structure of the national model of disaster and risk reduction. On the other hand, the horizontal axis distinguishes the orientation of a given element according to its position within the disaster risk management cycle: response, relief, recovery, reconstruction, mitigation, prevention and preparedness.

This exercise seeks to give us a synoptic perspective on the prevailing arrangement or tendency among the frameworks, and therefore on disaster management in

general. Figure 4.10 captures a centralised, top-down and reactive legal system that is centred in the predominant role of the national scale as the locus of administration of DRM and DRR. The centralisation of the model of governing disasters and risks surfaces when national powerful institutions concentrate –as they do in Santiago de Chile– and do not redistribute power and decision-making downwards and transversally among subnational levels. Centralisation of legal frameworks and decision-making could negatively impact DRM, disaster risks and vulnerabilities in different ways: low capacity at local level may create dependency; 'un-earmarked' funds –which could be used in other ways for DRR– can be diverted to other areas that have a higher political profile; there is low participatory DRR; and policy responses to disasters can result in inadequate actions and unforeseen effects, as they do not require paying attention to local realities and needs (Scott and Tarazona, 2011).

Another dimension within the model of DRM and DRR in Chile is the various instruments for territorial planning, and implications for the progression of vulnerability and risks.

### 4.4.3 Territorial planning instruments for DRM and DRR

Other important disaster management institutional forms are the Territorial Planning Instruments, or *Instrumentos de Planificación Territorial* (IPTs). According to the Ministry of Housing and Urbanisation, or MINVU (2015), the national legislation does not have an exact definition for IPTs: they are used interchangeably with 'plan of urban development', 'plan of territorial ordering', 'regional plan of territorial planning', among others (see the national legislation in MINVU, 1992a). An initial definition of IPTs offered by some official documents (MINVU, 1992a, 2015; UNDP and MINVU, 2014) would be that IPTs are documents that aim to advise the prioritisation of actions for the preparation of regional, provincial and municipal territorial plans. Likewise, IPTs aim to coordinate territorial planning with other authorities at different scales and engage with the community using participatory planning techniques.

One of the aspects of IPTs of importance for DRM and DRR is the identification of disaster-prone areas. IPTs have implicitly suggested since 1976 that local governments identify risk areas in their master plans (MINVU, 1976), but it was not until 1992 that DS N°42 (MINVU, 1992b) began to impose risk assessments, making them a requirement. Such assessments are often assigned to private engineering contractors or consulting companies. In order to define and delimit the process of identifying risk areas, DS N°42 (MINVU, 1992b) guides companies and institutions on what assessments should look at according to the following principles:

- Flood or potential flood areas due to the proximity of lakes, rivers, streams, creeks, un-channelled streams, ground water or wetlands.
- Avalanche-prone areas, boulders, landslides or accentuated erosion.
- Hazardous areas to be affected by volcanic activity, lava flows or faults.
- Hazardous areas generated by human activity or intervention.

Although disaster risk emerges as the result of combining hazards and vulnerability,[21] the aforementioned principles reveal that, from a policy framework perspective, risk is merely understood as hazards and, in some cases, exposure to hazards. In other words, so-called risk assessments do not make a comprehensive evaluation of risks but only of hazards, bringing to light the still dominant techno-centric approach that prevails. The problem with this is that governments are not using the full potential of risk assessments. Comprehensive risk assessments should look at vulnerabilities and their root causes with the same interest with which identify hazards: this may contribute to the production of plans and development paths for safer people and safer cities (UNISDR, 2015a, 2015b).

Table 4.9 shows how Chilean legislation has historically focused on the encouragement of risk assessments on master plans and land-use planning (MINVU, 1992a), confining the multi-scale complexity of hazards and vulnerability to the urban scale. I think that neglecting the analysis of risks on multiple scales

[21] Hazard × vulnerability = risk → disaster

simultaneously may limit the opportunity to reduce disaster risks substantially, as the root causes and dynamic pressures that produce vulnerabilities, and sometimes hazards too, are systemic and multi-scale (Wisner et al., 2004).

**Table 4.9. Territorial Planning Instruments (IPTs) that encourage risk assessments**

| IPTs | Regional area | Urban area | Rural area |
|---|---|---|---|
| Regional Plan of Urban Development | - | - | - |
| Regional Plan of Territorial Planning (PROT) since 2011 | ✓ | ✓ | ✓ |
| Inter-Municipal or Metropolitan Regulatory Plan | - | ✓ | - |
| Municipal Regulatory Plan | - | ✓ | - |
| Urban Boundary Plan | - | - | - |
| Sectional Plan | - | - | - |

*Compiled by the author (2017)*

In this sense, the Regional Plans of Territorial Planning, or *Planes Regionales de Ordenamiento Territorial* (PROTs), are a very interesting case. PROTs are the first IPTs that address risk assessments on the regional scale (SUBDERE, 2011a). Even more interesting about PROTs, but perhaps receiving less attention, is that they incorporate a guide to assess disaster vulnerability. When a regional government decides to initiate its own particular PROT, the SUBDERE –the promoter of regional development– delivers a document named *Guidelines on Natural Risk Assessments for Regional Planning* (SUBDERE, 2011b). This aims to orient regional governments in the evaluation of risks, including how to assess disaster vulnerability. However, this guide concentrates only on defining vulnerability assessments for regional critical infrastructures such as hospitals. It defines the identification of vulnerable factors in three areas (SUBDERE, 2011b, p.91):

- Analysis of the context. This refers to the study of the geographical location, including topographic, climatologic and other physical conditions.
- Local conditions. This refers to the study of infrastructure, such as buildings materials, foundations and the like.
- Functions. This involves an analysis of the services that the institution and infrastructure offer, its organisational structure, logistics and the like.

In the same vein, in July 2013, I interviewed a SUBDERE official who participated in the preparation of this guide. One aspect of the conversation was revealing about the assessment of disaster vulnerability:

> "Vulnerability is [in the PROTs] considered only in physical terms such as on the quality of building materials, proximity to hazards, and lacking of evacuation routes".
>
> (Pablo Gonzalez, male, National government official, July 2013, interview)

Here, Gonzalez and the analysis of the document reveal a fundamental aspect, a kind of trend that is repeated among the institutional forms reviewed so far: it is a techno-centric approach with a belief that by mastering only the physical dimensions of hazards and vulnerability, disasters and risks will be reduced. The international and historical experience has demonstrated the opposite (UNISDR, 2015a), as a comprehensive social and environmental analysis of hazards and vulnerability is needed, including the capacities and resiliency of men and women, communities and institutions, as well as the political, economic, governance and cultural dimensions of risks at multiple levels, and all this intertwined with the history that comes with it (UNISDR, 2015b). Another interesting aspect emerges from the way in which vulnerability is conceived in the guide mentioned above, and of relevance for the implementation of PROTs: vulnerability and risks are limited to circumstances and conditions at local levels –neighbourhoods, city. Effectively, when I reviewed the section on vulnerability (SUBDERE, 2011b, pp.14-15), only local unsafe conditions had to be identified, but not the drivers of such conditions – neither the linkages of such conditions with dynamic pressures nor the root causes that could have generated them in the first place. It is like all multi-scale relations are missing.

I also interviewed an executive member of the SUBDERE who shed light on a fundamental limitation of PROTs:

> "Probably regional governments will commission PROTs to be prepared by private consulting companies in order to comply with the request. Then, I am sure, governments will archive the document [PROT] because there is no way to enforce regional governments to take actions in order to reduce detected vulnerabilities and risks [...] we must still work on that –that is, in policy terms".
>
> (Jorge Mardones, male, National government director, June 2013, interview)

Although SUBDERE assigned PROTs to regional governments in 2011, only a few regional governments have prepared their PROTs, at least towards the end of the fieldwork in December 2014. This reveals another limitation of PROTs, as they are not binding planning tools, just advisory ones. This also applies to most IPTs, except the Municipal Regulatory Plan (MINVU, 1992b). Thus, what is the purpose of requesting more comprehensive risk assessments if the actions to reduce or mitigate risks may or may not be implemented? I think this is a disincentive for regional governments and municipalities, as is the top-down approach by which these IPTs are requested.

In January 2014, the MINVU and United Nations Development Programme (UNDP) launched a document titled the *National Strategy of Urban Development* (UNDP and MINVU, 2014), with the intention that it should become a bill by 2018. This document deserves to be mentioned here because it aims to redesign IPTs in order to integrate them into a national strategy of urban, regional and national development. In doing so, the proposal points out "the importance of introducing the concept of DRM, DRR, and resilience into IPTs in a better way" (UNDP and MINVU, 2014, p.43). It recognises that DRM has to be integrated into development as a critical part of it. More importantly, this document recognises that the integration of DRM and DRR into IPTs "must consider inter and multi-scalar interdependencies among different political-administrative and spatial orders" (UNDP and MINVU, 2014, pp.56-57). In other words, the model of DRM and the reduction of vulnerability must be seen from a multi-scalar perspective. This somehow corroborates the relevance of the topics addressed in this thesis.

Before continuing with the final section of this chapter, I would like briefly to offer some reflections on the financing of and spending on DRM and DRR in Chile. I do so

because it has been demonstrated that financing and spending patterns within disaster risk management are equally important to the effectiveness of such processes (Kellett et al., 2014).

*Financing of and spending on DRM and DRR*

Unfortunately, comprehensive studies and analyses of the financing of and spending on DRM and DRR in Chile are absent in literature. However, some insights can be gained by reviewing the Law of Government Budget to Public Sector, or *Ley de Presupuestos*, for a given period –e.g. 2008-2013– and its expenditure on DRM institutions such as the ONEMI. According to this law in 2013 (Ministerio del Hacienda, 2013), the total budget to the public sector was US$ 58,964 million, while the budget of the ONEMI for the same period reached US$ 19.6 million, which represents 0.0071 per cent of the national GDP (World Bank, 2017).

**Table 4.10. ONEMI's annual budget in relation to the national GDP 2008-2013**

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|
| National GDP in US$ M | 179,627 | 171,957 | 217,538 | 250,832 | 265,232 | 277,079 |
| ONEMI budget in US$ M | 7,998 | 10,194 | 11,755 | 9,942 | 13,464 | 19,628 |
| % of the national GDP | 0.0045% | 0.0059% | 0.0054% | 0.0040% | 0.0051% | 0.0071% |

*Compiled by the author (2017), based on Ministerio de Hacienda (2013) and World Bank (2017)*

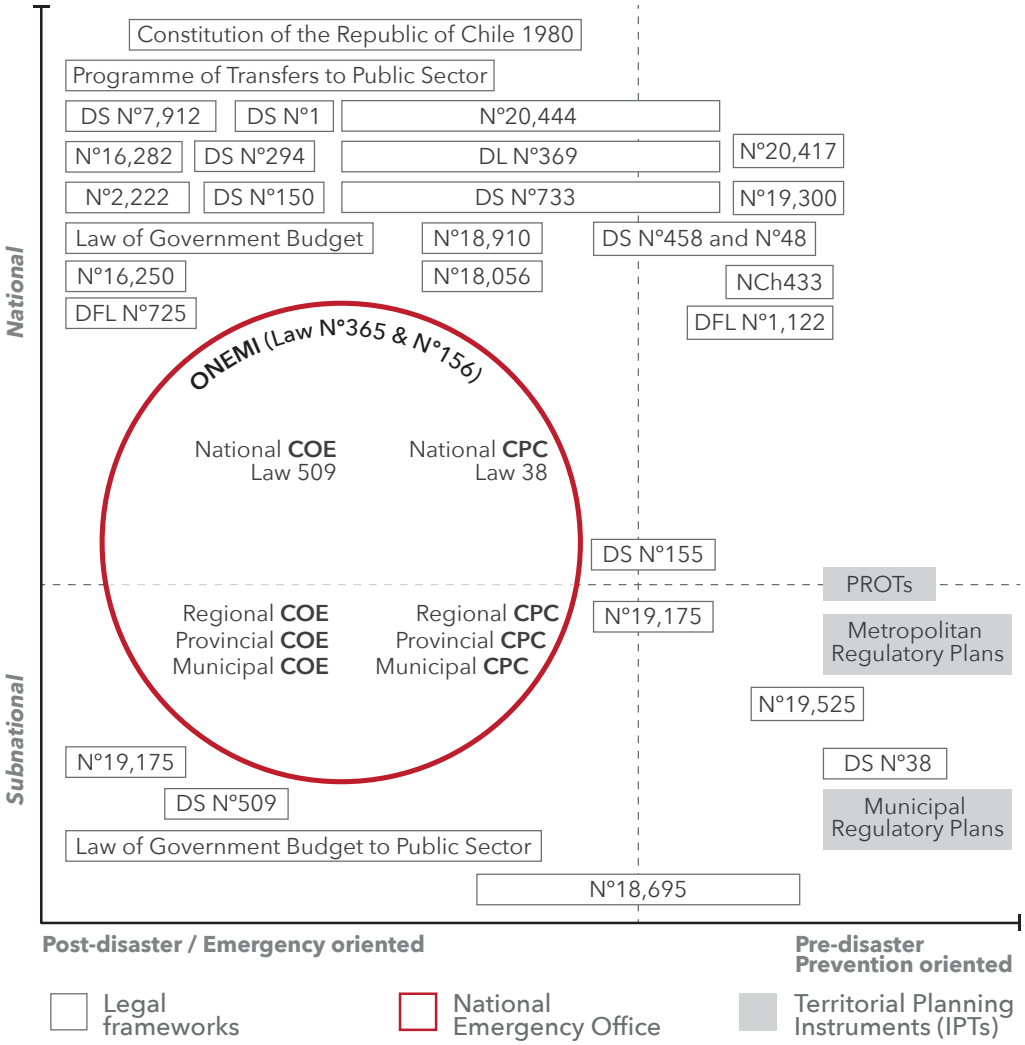
Table 4.10 excludes spending for mitigatory measures implemented by the Ministry of Public Works. Therefore, this can be seen as an interpretation of DRM spending only, and not necessarily representative of DRR actions. Nevertheless, this interpretation of DRM spending is valuable because the ONEMI is the most important state effort in DRM and DRR, and its budget includes spending for the promotion of resilience, preparedness and prevention, as well as emergency response and relief. Further investigations into this aspect could be particularly useful to give us insights into the prioritisation and/or marginalisation of certain projects, communities and social groups. This could lead to a more refined analysis of the model of managing disasters and reducing risks from a multi-scale perspective.

To conclude provisionally, the final section of this chapter aims to synthesise the key elements that have emerged so far and connect them with the analytical framework and objective of the thesis.

### 4.5 Setting the context to analyse post-disaster Chaitén

This chapter began by explaining that it is the first of two parts focusing on the case study. The chapter sought to introduce the historic, institutional and territorial scale and context of Chile, as well as the relations with its model of disaster risk management and reduction. From what has been discussed so far, one can extract several insights that are indispensable to explore the case of post-disaster Chaitén from a multi-scalar perspective. Firstly, the 'cyclical' facet of DRM has historically been an ignored aspect of the Chilean history of disasters. Beyond emergency and relief, other processes such as reconstruction, mitigation and preparedness have not been considered with the same level of attention by the dominant views of disasters in Chile. Perhaps for this reason the current model of DRM is in question (Imilan et al., 2015), as it mainly concentrates on emergency responses and the application of technological solutions rather than on prevention and on comprehending the social causes of risks. Secondly, we reviewed the historical formation of geographical scales in Chile in order to prepare a multi-scale analysis of the progression of vulnerability for the case of Chaitén. Here, I proposed that the centralised territorial structure of the state has had, and continues to have, an important influence on the way that the DRM and DRR model is conceived and implemented, and therefore on how decision-making, policy responses and disaster governance are conducted. Finally, I examined how DRM and DRR, and other institutional forms, are defined, organised and distributed within this multi-scalar structure of territorial organisation in Chile. This illustrated the influence that the territorial structure has on the mode of managing disasters and risks: it is a highly centralised model, a top-down approach, and is reactive or post-disaster oriented. In Figure 4.10 (page 168) I described relevant legal frameworks for the DRM and DRR and categorised them in terms of their vertical position or hierarchy within the decision-making and territorial structure of the state, as well as the orientation of such frameworks within the DRM cycle. Figure 4.11 expands the analysis of the mentioned frameworks to the other analysed institutional forms: the ONEMI and territorial planning instruments.

**Figure 4.11. Map of the institutional forms for DRM and DRR in Chile**




*Source: elaborated by the author (2017)*

The figure above serves to answer the question: how is the model of DRM and DRR in Chile –especially policy responses to disasters– organised at different geographical levels, and why? The DRM and DRR can be represented by its constituent institutions, legal frameworks and planning tools. As was discussed earlier, the organisation of these components indicates a concentration of power in terms of decision-making which will affect policy responses to disasters, as well as all other aspects of DRM. Concentration at the national scale may ensure that policy responses are mainly dictated from the top-down, thus conflicting with local

participation and the inclusion of local demands and needs, and therefore with the effectiveness of such responses. In recalling what was discussed in Chapter Three on geographical scales, it could be said that the territorial structure of the Chilean state apparently corresponds to a vertical organisation: subnational institutions such as regional and provincial governments, and municipalities, are subsequently and schematically subordinated from the national to the local levels. As presented here, this scalar organisation is a consequence of historical socio-political and economic processes, and it has influenced the logic of the current geographical distribution and hierarchical organisation of DRM and DRR. In other words, the processes are apparently connected. The question now is, what are the effects of this centralised, top-down and reactive-oriented model on the progression of vulnerability, and how does this take place? This is something I will try to respond to by utilising the case of post-disaster Chaitén.

# Chapter FIVE: The case of post-disaster Chaitén
## Unpacking the policy responses

### Introduction

This chapter looks at how the progression of vulnerability has taken place in and around post-disaster Chaitén, and how the processes and circumstances that constructed DRM and DRR practices could reproduce vulnerabilities in the future.

At the beginning of this thesis, I announced that this chapter represents the second phase of the case study. The previous chapter contextualised the historic conditions of the contemporary scalar geography of Chile –characterised by a vertical decentralisation– and it reviewed how such scalar configuration was mirrored by the model of disaster risk management (DRM) and disaster risk reduction (DRR). This means that the mode of managing disasters and risks in Chile is, in certain way, centralised, top-down and reactive. This logic of managing also applies to policy responses to disasters and decision-making. Therefore, this chapter asks how DRM and DRR policy responses to disasters are connected with the unfolding of the progression of disaster vulnerability at different levels. To illustrate this inquiry, I propose the following scheme as a guiding map to navigate Chaitén's narrative.

**Figure 5.1. Rationale for the second phase of the case study**

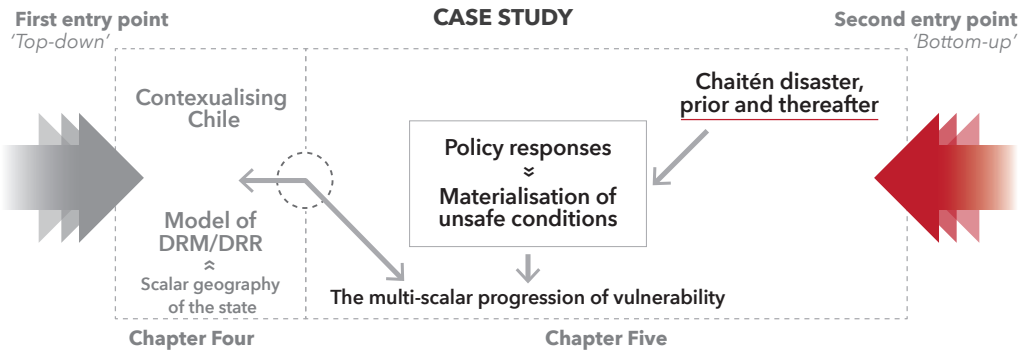
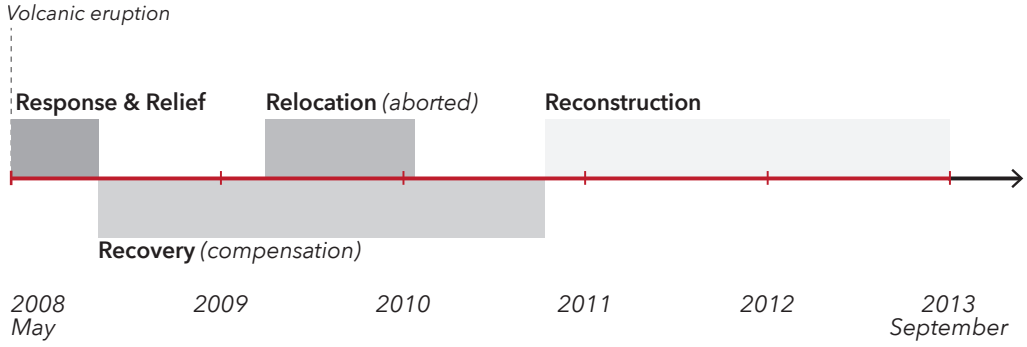


Figure 5.1 develops two entry points. One could be called 'top-down', as it attempts to contextualise and reflect processes of policy response from more general social processes such as the Chilean state territorial organisation and its model of DRM. In contrast, this chapter represents an inductive or 'bottom-up' entry point, because it tries to reflect the progression of vulnerability from the specificity and locality of Chaitén, that is, from processes of policy response and decision-making to the materialisation of unsafe conditions. The rationale described in Figure 5.1 situates the Chaitén disaster in the adjacent impacts and responses. This includes policy responses from authorities, governments and institutions at different levels –i.e. local, regional and national. From this initial point, I will try to connect such responses with the underlying causes of unsafe conditions and vulnerability, and so trace the progression at multiple levels. The aim is to address why policy responses in Chaitén have not effectively help to reduced vulnerability. For instance, I analyse how the process of evacuation (section 5.2.2, page 198) may have affected people's trust in authorities –an unsafe condition– as the process created several negative effects within the community.

Through this, I seek to illustrate the scalar relations between unsafe conditions, dynamic pressures and root causes. I do so by framing it within the Pressure and Release (PAR) model. The analysis of such connections will not be limited to the emergency responses, but will also include relief, recovery, relocation and the reconstruction of Chaitén in the period between 2008 and 2013. Figure 5.2 shows the four post-disaster phases that are addressed in this chapter.

**Figure 5.2. Analysed period of policy responses in the Chaitén disaster, 2008-2013**



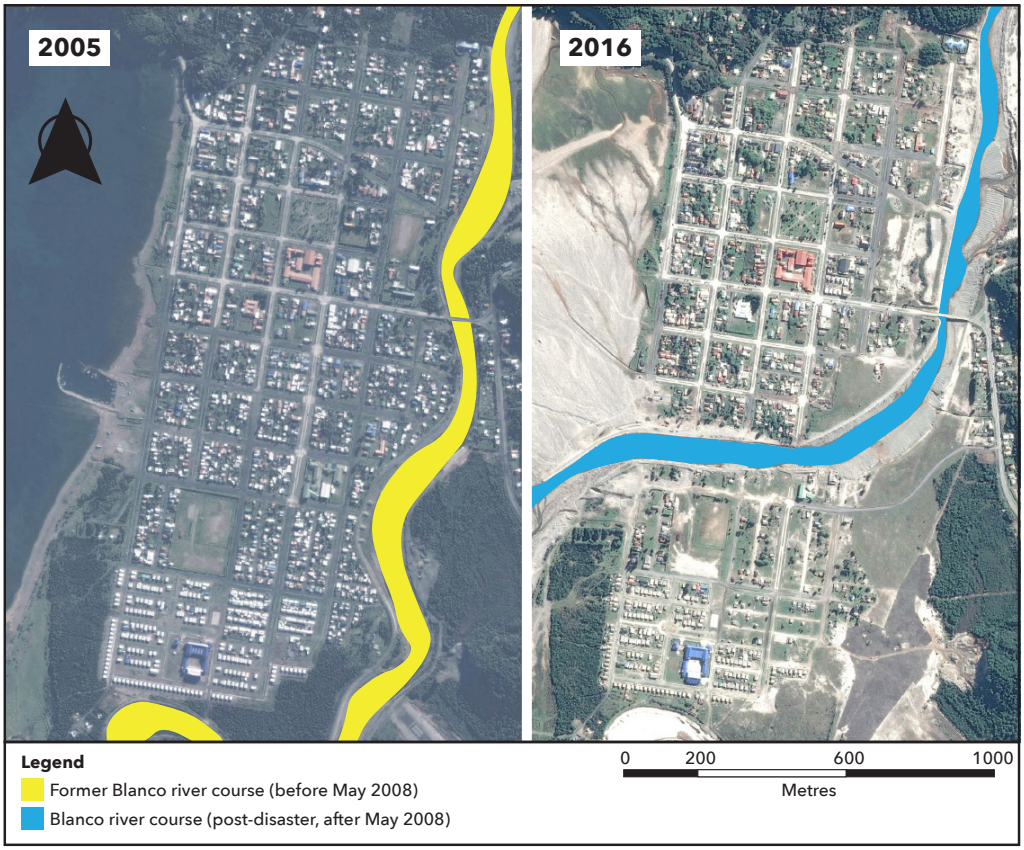
The next five sections analyse these phases. The first section contextualises Chaitén –historically, geographically and economically– and looks at the circumstances of the disaster and its immediate aftermath. The second section concentrates on the early response, including the evacuation. The third section analyses two parallel processes: the compensatory strategy and the relocation of Chaitén. It discusses tensions between local and national decision-making processes, community mobilisation and national politics. The fourth section looks at the latest post-disaster phase, the reconstruction. The last section offers a final analysis of the progression of vulnerability in Chaitén considering the multi-scalar context of Chile and its model of DRM.

## 5.1 Chaitén, before and after the volcanic eruption: preparing the case

Chaitén is a remote city port in Los Lagos Region about 1,000km south from Santiago. Chaitén was severely affected by a volcanic eruption in May 2008 at a time when roughly 8,000 people lived in the commune. Figure 5.3 summarises the principal physical effect of the volcano's eruption on the city –that is, the new course of the Blanco River. This new course literally divided the city into the North and South sectors. Other physical effects of the volcanic mudflows can be appreciated in Figure 5.4.

Before presenting in detail the disaster itself and its immediate aftermath, it is opportune to start this section by offering a historical perspective on Chaitén's people, economy and geography in order to contextualise local responses to the emergency procedures, and to better comprehend people's reaction to relocation and reconstruction. Specifically, I highlight two fundamental aspects: the sense of remoteness and poor connectivity of Chaitén with respect with the region and the country, and the local economy's dependency on the public sector. These two aspects are fundamental because they allow us to understand the cohesiveness among certain groups of *Chaiteninos* –as Chaitén people call themselves– and the demands made of the government for more attention.

**Figure 5.3. Chaitén before and after the volcanic eruption**




*Sources: elaborated by the author (2017); satellite image from IGM (2012) and Google Earth Pro (2016)*

**Figure 5.4. Physical impacts of the volcanic mudflows in Chaitén, May 2-4, 2008**

*Source: Municipalidad de Chaitén (2008)*

### 5.1.1 Introducing Chaitén

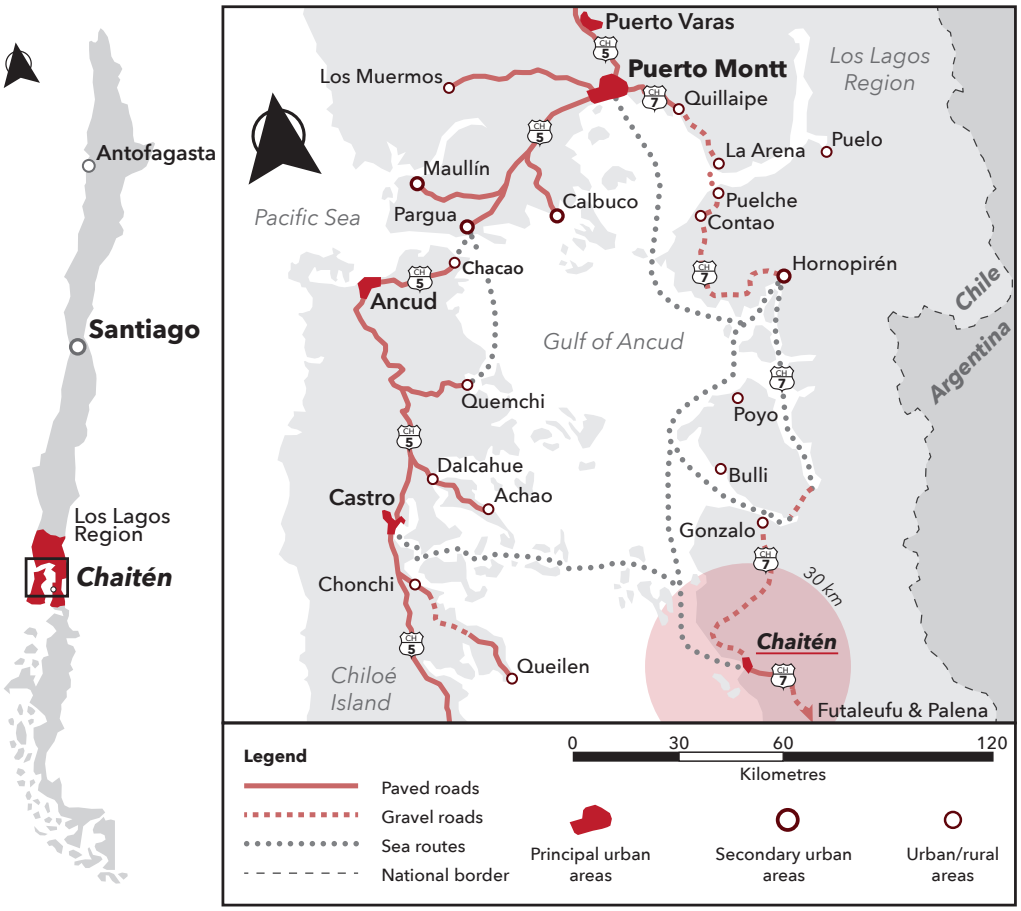
Chaitén was founded in 1959 by President Arturo Alessandri Palma, who wanted to populate this region for geopolitical reasons (Delgado et al., 2005),[22] reasons which still persist among the narratives of local and national public authorities (Gobernación Provincial de Palena, 2015; Municipalidad de Chaitén, 2014a; Turres, 2014). Because Chaitén is a port city, it served as the entry point for settlers and merchants inland, a vast region of over 41,000 square metres. Until the opening of the Austral Highway (CH-7), or *Carretera Austral,* in 1988, Chaitén was significantly isolated from the rest of the region and the country, with only minor horse-traversable roads connecting the city with neighbouring villages. Since then,

[22] According to several interviewees, Chaitén's location has military and economic importance due to its proximity and connection to the Pacific Ocean and its existence as a hub for commerce.

however, the CH-7 has connected most of the villages, towns and cities in Los Lagos and Aysén regions (see Figure 5.5).

Nevertheless, with the CH-7, the isolation of Chaitén was only partially solved because, both before and after the disaster in 2008, Chaitén lacked significant and important ways of communicating between the city and the rest of the region and the country. A proof or recognition of the latter is that Chaitén holds the official category of 'Isolated Location' or *Localidad Aislada* issued by the Inter-ministerial Committee for the Development of Remote and Special Areas or CIDEZE (GORE Los Lagos and Gobierno de Chile, 2012). Being an 'isolated location' means, on the one hand, the allocation of special state support and resources for the city's development but, on the other hand, this evidences the situational remoteness in which Chaitén is embedded. Remoteness has several implications. Although remoteness is often understood in physical and spatial terms, remoteness has different effects on people, institutions, the economy and development (UNDESA, 2014). For instance, remoteness may imply intrinsic vulnerability due to high external transport costs, time delays and high costs in accessing external goods, and delays and reduced quality in information flows, among others (UNDESA, 2014). According to Pelling and Uitto (2001), it affects disaster mitigation capabilities due to limited hazard forecasting ability and little insurance cover. Furthermore, it can have demographic and economic implications: limited human resources, rapid population changes, population concentrated in coastal zones, and diseconomies of scale, leading to high per capita costs for infrastructure and services, dependence on external finance, small internal market, and dependence on natural resources, among others.

**Figure 5.5. Map of Los Lagos Region**




*Source: elaborated by the author (2017)*

Prior to the eruption, Chaitén had around 7,200 inhabitants, 4,700 of whom lived in the urban area (INE, 2002). Although there is a clear distinction between urban and rural areas, Chaitén city and its municipal district encompass a very active interchange of urban and rural lives, as was highlighted during the interviews with two community leaders[23] who referred to this aspect:

[23] As introduced in Chapter Two, for ethical reasons (confidentiality and anonymity), I decided that all interviewees' names would be replaced by fictitious ones, whilst gender, institutional affiliation, position and date of interaction is provided.

> "Chaitén is a small commune; people living in the country side visit the Port [Chaitén city] regularly, if not daily, for many reasons, but mainly because it is accessible and near to everybody".
>
> (Teodoro Benitez, male, Community leader, March 2013, interview)

> "During summer, we organise fairs and other cultural events; all people from the commune come [...] people here know each other [...] living in the countryside is nice, but sooner or later you need to come to the city because of the kids, bills, the bank, etc".
>
> (Rosa Carcamo, female, Community leader, March 2013, interview)

These interviewees reflect an intense interchange between rural and urban lives, but also denote closeness between *Chaiteninos*. This closeness promotes social trust and cohesiveness (Cooper et al., 2014), as was evidenced with the group 'the rebels' or *los rebeldes* who returned to the city –despite the existing ban– months after the disaster. Figure 5.6 reflects some of the activities that are promoted by neighbourhood groups. The first (left) was a community party to celebrate the end of the school year, and the second (right) a cycling children's group activity.

This cohesion is also perceived through the community mobilisation that wanted to bridge the North and South sectors of Chaitén, claiming a united city. The 'rebels' and the demand for a bridge will be addressed briefly later on, in sections 5.3.2 and 5.4.3 respectively. Therefore, although this study does not concentrate on community cohesion as a positive element necessary for disaster recovery (Wisner et al., 2004), it is important to understand some of the community responses in recovery and reconstruction processes.

**Figure 5.6. Community activities in Chaitén**

*Source: Leonardo Garcia Godoy (2014)*

According to the now dissolved Ministry of Planning (MIDEPLAN),[24] the economy of Chaitén significantly changed after the opening of the CH-7 (MIDEPLAN, 2003). Prior to 1988, Chaitén's economy was primarily based on fishing one, with artisanal fishing communities and fishing fleets offshore. Local production supplied seafood processing, frozen food and canned food industries in the region. Although fishing activity continued after the opening of the CH-7, it declined totally after the volcano's eruption in 2008. In 2013, during the fieldwork, there was neither recognition nor register of any important fishing activities in Chaitén. To identify the main economic activity in Chaitén before and after the volcanic eruption, I conducted a frequency distribution of the number of workers per economic activity (see Table 5.1). I looked at the number of workers because it was not possible to find data on the actual composition of the economy of Chaitén.

[24] In 2011, the government of President Piñera transformed MIDEPLAN into the current Ministry of Social Development.

**Table 5.1. Number of workers per activity (private sector) in Chaitén and Los Lagos Region between 2006 and 2013**

| | Chaitén | | | | Los Lagos Region | | | |
|---|---|---|---|---|---|---|---|---|
| **Activity** | **2006** | **2008** | **2010** | **2013** | **2006** | **2008** | **2010** | **2013** |
| Agriculture, livestock, forestry | 15 | 10 | 28 | 29 | 28,472 | 39,714 | 36,594 | 30,560 |
| Fishing | 0 | 20 | 0 | 1 | 24,504 | 27,786 | 14,749 | 23,686 |
| Non-metallic manufacturing | 5 | 5 | 13 | 2 | 22,943 | 24,752 | 18,357 | 24,155 |
| Metal manufacturing | 7 | 8 | 6 | 22 | 5,617 | 7,052 | 7,156 | 8,897 |
| Construction | 87 | 99 | 163 | 148 | 28,937 | 36,658 | 33,130 | 41,025 |
| Wholesale, retail trade | 54 | 61 | 72 | 107 | 42,186 | 48,965 | 38,893 | 45,646 |
| Hotels and restaurants | 50 | 33 | 39 | 122 | 7,504 | 8,700 | 7,489 | 8,728 |
| Transport, storage, communications | 2 | 3 | 4 | 0 | 12,784 | 16,805 | 14,329 | 20,818 |
| Real estate, business and rental activities | 4 | 5 | 9 | 0 | 22,329 | 23,703 | 21,255 | 29,570 |
| Other | 2 | 0 | 17 | 19 | 58,534 | 51,388 | 59,267 | 57,719 |
| **Total** | **226** | **244** | **351** | **450** | **253,810** | **285,523** | **251,219** | **290,804** |

*Compiled by the author (2017), based on BCN (2011, 2015)*

Table 5.1 shows that the four principal activities (in grey colour) are the construction sector, retail and wholesale, hotels and restaurants, and finally agriculture and livestock. Families in rural areas of Chaitén continued their businesses in agriculture and livestock after the volcano's eruption in 2008 (ODEPA, 2013), despite the fact that most of their animals perished and the animals' food reserves were badly spoiled (PUC et al., 2009). Accordingly, affected families and producers received compensatory subsidies for their losses (INDAP, 2009). In section 5.3.3 (page 212), I will develop more on this issue, as compensatory policies represent one of many mechanisms adopted by the national government to alleviate the impacts of the disaster.

Unfortunately, the socio-economic data collected by the National Socio-Economic Survey (CASEN) cannot provide information on the population of Chaitén between 2008 and 2010 as the *Chaiteninos* were dispersed across different Chilean regions. The CASEN survey is a key component of public policy in Chile due to it being the greatest and most detailed measurement –after the national census– of social and economic micro-data (Galasso and Farías, 2014). Presumably, the lack of information

on Chaitén during that period may have affected short-term public policies for recovery, in addition to long-term decision-making such as on the relocation of Chaitén and its subsequent reconstruction. These policies and decisions are revised later, but draw our attention to this lack of information as a potential dynamic pressure.

One area of activity that experienced a significant increase was the construction sector. From 2006 to 2013, the number of workers increased from 87 to 148. Another activity which is an important part of Chaitén's economy is tourism, although the only indicator of the latter is the number of workers in hotels and restaurants (see Table 5.1 above), which actually decreased between 2006 and 2013: there are no studies or official figures that demonstrate or refute the importance of the tourism industry. In this regard, I interviewed several local authorities from the Municipality and the provincial government who referred to the economic situation of Chaitén prior to and after the volcanic eruption.

> "Chaitén is a subsidised city: one third of the commune's income is generated by the FCM [Common Municipal Fund] and by projects funded by regional and central governments [...] Half of Chaitén's workers are employed directly in public services, the other half depends, at some point, on the public sector [...] Chaitén is nowadays as it used to be in the past [...] we received a lot of [economic] support from the [national] government".
>
> (Pedro Delgado, male, Local government director, May 2013, interview)

> "We have allocated special resources to families [for businesses] thanks to special funds from the [national] government [...] During 2012 we tried to generate local businesses and to strengthen some family businesses based on agriculture and livestock, but it is difficult; we help them to survive".
>
> (Veronica Zarate, female, Local government director, March 2013, interview)

> "The provincial government, and also the Municipality, have made efforts to attract private investment, mainly for tourism and related services [...] I do not know why, but the result is few investments and few jobs in all [economic] sectors [...] our economy is stuck".
>
> (Antonio Gomez, male, Local government council member, July 2013, interview)

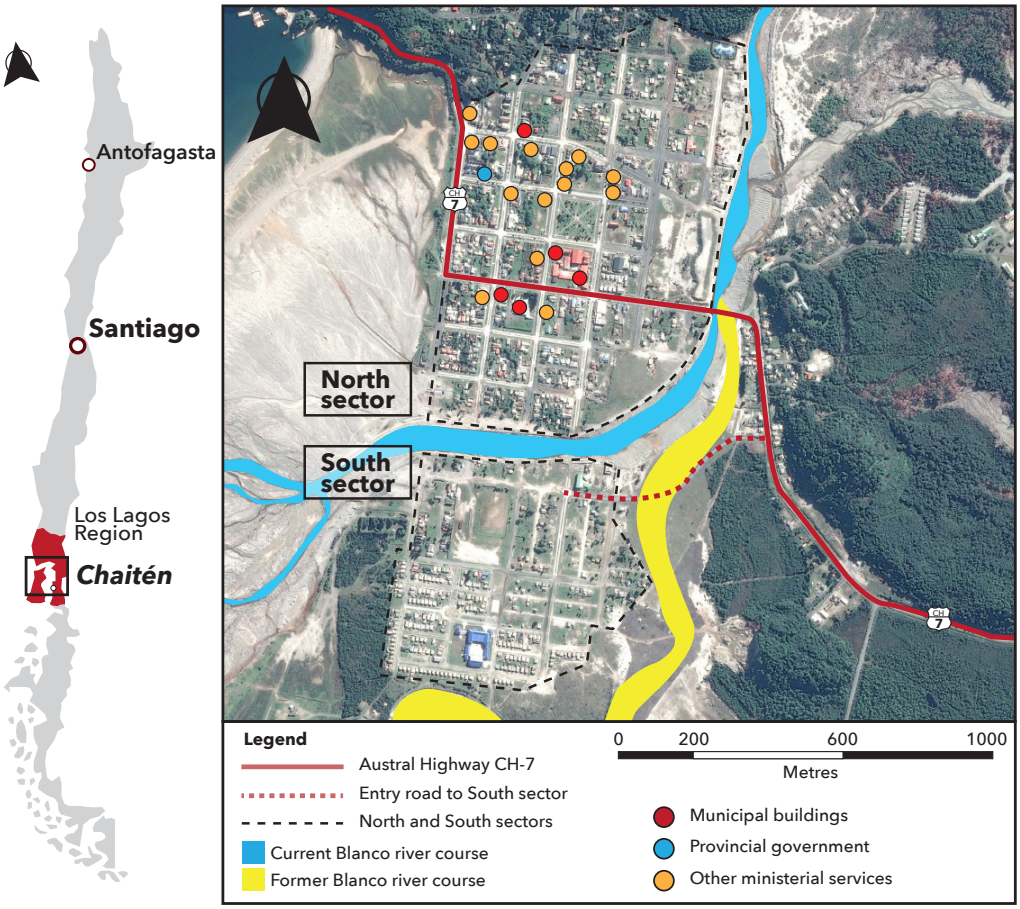
In the extracts above, two relevant aspects can be observed, the first related to the idea that Chaitén relies on the public sector to sustain its economy, the second that the economy is paralysed and stuck. The latter is difficult to uphold as the number of workers in Chaitén between 2006 and 2013 increased by about 99.1 per cent (from 226 to 450), in much higher proportion than the region –14.6 per cent, from 253,810 to 290,804 in the same period (see Table 5.1, page 188). The supposed dependency of Chaitén's economy on the public sector is also difficult to estimate using only the number of workers or companies, as there are no figures or indicators available to triangulate these data with public-state services in the city –e.g. infrastructure maintenance and municipal services such as education and health, among others. However, as the municipalities are entitled to generate public incomes via local taxes and to receive public funds, looking at the financial situation of the Municipality of Chaitén could shed light on such supposed dependency. This is addressed in the next section, as the municipal economy may help us better to understand the hierarchical and vertical relationship between Chaitén and the state during the recovery and reconstruction phases.

### 5.1.2 A subsidised city?

To gain an initial approximation of the presence of the public sector[25] in the city's economy, Figure 5.7 maps all municipal services and provincial offices of ministerial services located in Chaitén in September 2013. Although the number and distribution of these public buildings is not an accurate indicator of the role of the public sector as the main source of local income, the figure shows an important number of infrastructures: in 2013, there were 20 government offices in Chaitén from at least 11 ministries.

[25] This is based on the theory of political architecture (Schumacher, 2012, Chapter 9).

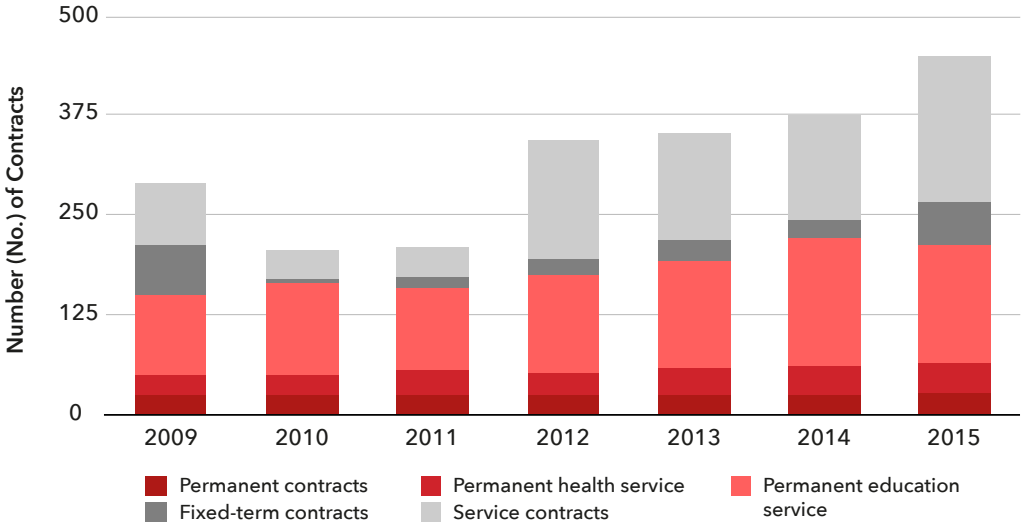
**Figure 5.7. Public service buildings in Chaitén in 2013**




*Source: elaborated by the author (2017); satellite image from Google Earth Pro (2016)*

The Municipality of Chaitén was the most important in terms of numbers of buildings and workers. The histogram in Figure 5.8 (see also Appendix 8) shows the Municipality producing 349 municipal contracts in 2013 between permanent and fixed-term services. Of these contracts, 192 were permanent contracts, this representing 55.0 per cent of the total number of workers in the private sector for the same year (see Table 5.1, page 188). This indicates the important role of the Municipality –and the public sector– in Chaitén's economy.

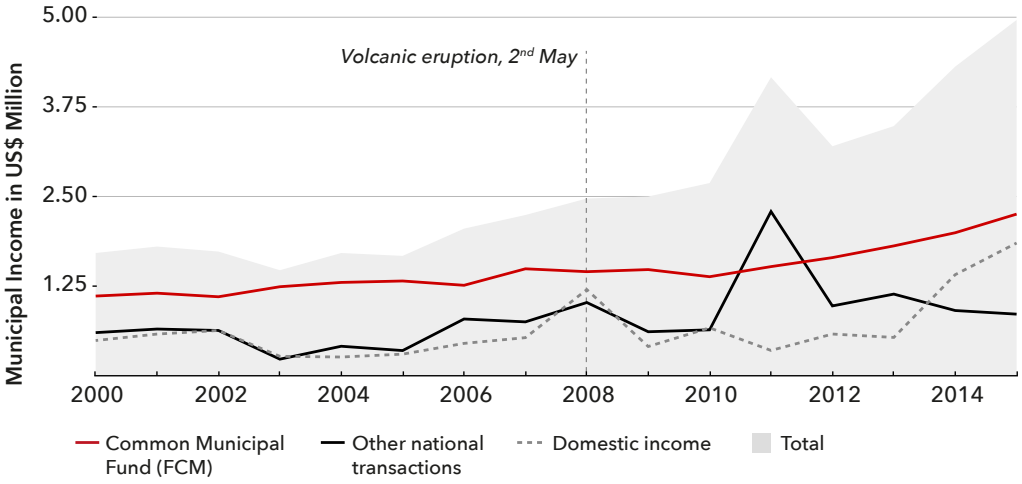
**Figure 5.8. Chaitén municipal personnel by number and type of contract (2009-2015)**




*Sources: elaborated by the author (2017), based on Municipalidad de Chaitén (2009; 2010; 2011; 2012; 2013; 2014a; 2015)*

However, the Municipality plays a crucial role not only in the local economy, but also in the recovery, reconstruction and development of the city. It controls important development funds such as the Common Municipal Fund, or *Fondo Común Municipal* (FCM), and 'national transfers'. The FCM is a redistributive mechanism encompassing all municipalities in the country that aims to balance municipal budgets from wealthier to poorer communities. Other municipal incomes are directly allocated by national institutions in order to administer critical services such as health and education. Furthermore, the Municipality can compete for national funds to develop specific urban projects and programmes via 'national transfers'. In 2011, the year when the city's reconstruction began, the entity accounted for US$ 4.16 million, of which US$ 1.52 million was acquired from the FCM and US$ 2.29 via national transfers. This represents that 91.5 per cent of the municipal budget came from national funds (see Figure 5.9 and Appendix 9).

**Figure 5.9. Chaitén municipal income by domestic and national incomes (2000-2015)**




*Sources: elaborated by the author (2017), based on Municipalidad de Chaitén (2009; 2010; 2011; 2012; 2013; 2014a; 2015) and SINIM (2016)*

In addition, this calculation excluded all investments in large infrastructures made directly by other ministries, such as the flood barrier by the Ministry of Public Works in 2012. Therefore, it seems plausible to think of Chaitén as a subsidised city, as its principal institution is deeply reliant on national support, and this is true both before and after the volcanic eruption. Looking beyond the reasons for this, a high dependency on external financing could result in higher exposure and vulnerability to disasters (Wisner et al., 2004) in the sense that local institutions can become more fragile and susceptible to national economic ups and downs, and DRR projects may be less prioritised than projects with higher political profiles (Pelling, 2003a). This economic vertical relationship between the national and the local could also be useful in observing the multi-scalar progression of vulnerability, when such dependency is seen as a dynamic pressure in times of economic crisis.

## 5.2 The Chaitén disaster: emergency response

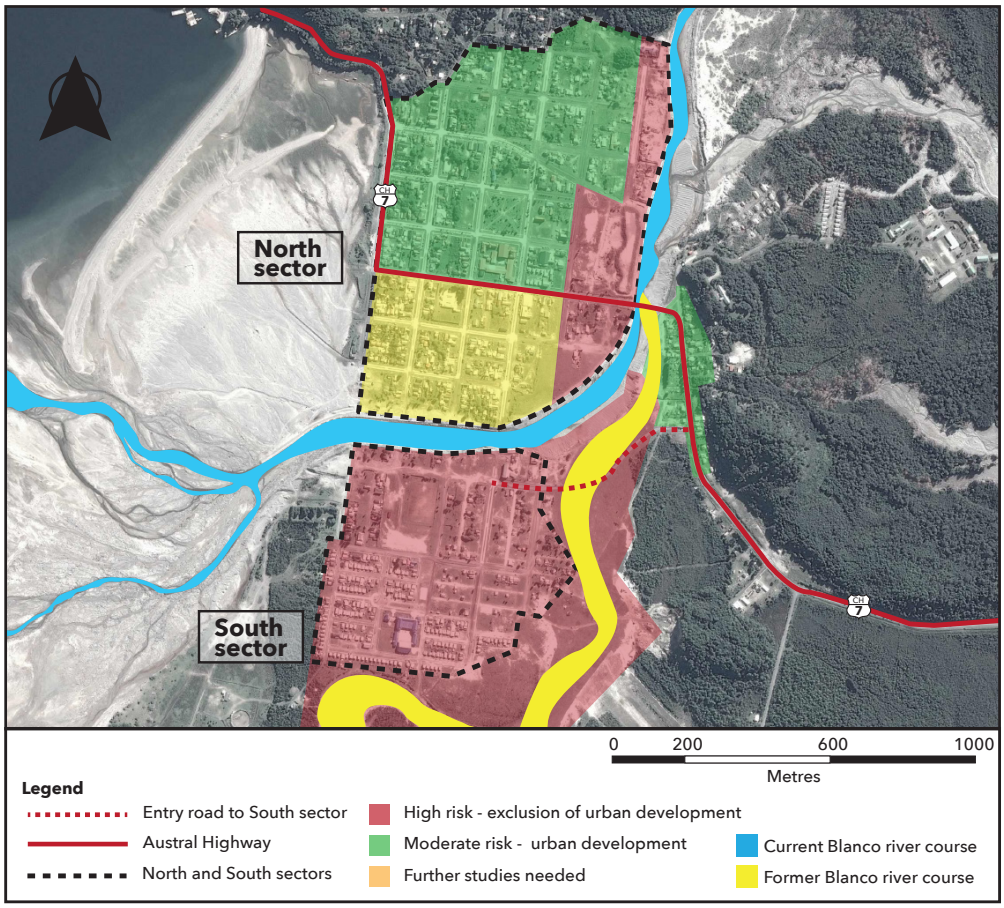
To build the storyline of the progression of vulnerability in Chaitén, I started from the days before the volcanic eruption and worked through until the reconstruction, concluding in 2013. While constructing the storyline, I have gone back and forward

several times to connect the case antecedents with those aspects discussed in Chapter Four –the centralised, top-down and reactive model of DRM and DRR.

Based on two technical reports commissioned by the national government in 2009 and 2010 (CIMM T&S Consultores, 2010; Infracon S.A., 2012) and one qualitative study in 2013 (Ugarte and Salgado, 2014), I began my observations and interviews in Chaitén, assuming two vulnerable conditions: the limited access to services and the uneven distribution of risks. The first relates to the difficulties that men and women, especially in the southern sector, have in accessing basic public services such as health, water, sanitation and transportation. The second refers to the risk of exposure to floods and mudflows as a consequence of future volcanic eruptions, which is again distributed unevenly between the North and South sectors of the city. This situation is accentuated by the limited access to services, leaving the South sector more at risk (see Figure 5.10).

In Figure 5.10, it can be seen that the North and South sectors are both populated areas, with about 4,000 people living in the North and 500 in the South. More importantly, the figure shows the uneven distribution of exposure of the city to volcanic mudflows. Evidently, the South sector is more exposed and therefore more at risk than the North, where flood barriers have been in place since 2011. This is accentuated by the fact that the South sector has limited access to basic services such as water, sanitation, education and health. This uneven distribution of risk and the limited access to services are indeed two unsafe conditions materialised locally in the city of Chaitén. Certainly, these conditions came about after several processes and post-disaster decisions where policy responses played an important role. Thus, what are the dynamic pressures and their root causes that produced these unsafe conditions? To elucidate this, we need to examine policy responses and decision-making from the volcanic eruption onwards.

**Figure 5.10. Map of exposed areas, and labels by national authorities**




*Sources: elaborated by the author (2017), based on CIMM T&S Consultores (2010) and Infracon S.A (2012); satellite image from Google Earth Pro (2016)*

### 5.2.1 Emergency meetings and the 'dormant' volcano

On the morning of April 30, 2008, the inhabitants of Chaitén were awoken by unusual seismic movements. The same day, regional authorities established a Regional Emergency Operation Centre (COE) to monitor the situation. By law, COEs are established by the jurisdictional authority –e.g. the Mayor at the municipal level– and are to work with other local institutions and community organisations which have the responsibility of evaluating, managing and taking action in a specific emergency (Ministerio del Interior y Seguridad Pública, 2002). The COE, headed by the *Intendente* of Los Lagos Region, Sergio Galilea, included local services such as *carabineros*, Navy, health service, fire service, army and some neighbouring

organisations. According to several interviewees, since the establishment of the regional COE, some issues have arisen. A local leader and a resident who attended such meetings refer to it as follows:

> "These meetings were very strange because from the beginning they [authorities] said that the tremors were only seismic activity without risks [of stronger quakes] [...] they explained to us about the tectonic movements. But in reality they had no idea [...] because there was an eruption two days later [...] The meetings always started about the movements and tremors, and from the very beginning the discussions used to turn into local problems such as connectivity, poverty, abandonment and other non-related things".
>
> (Pablo Carcamo, male, Community leader, March 2013, interview)

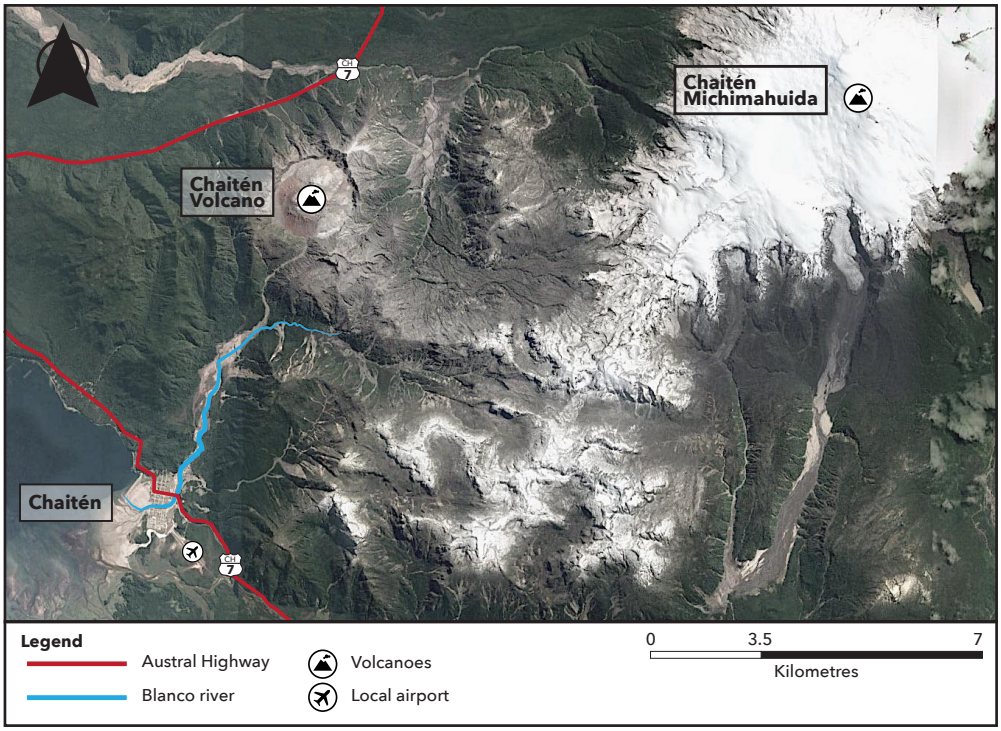
> "Nobody really knew what was going on [...] even when the authority tried to explain to us with figures and drawings that these movements where tectonic, we knew that they were not [...] many people used to point to the volcano [...] in the end, people were right".
>
> (Isabel Jimenez, female, North Chaitén resident, March 2013, interview)

What emerges from the above transcript is a lack of information about the nature of the hazard, producing uncertainty and concern among the population, something that would later stimulate distrust in authorities: this will be examined throughout this chapter and in Chapter Six. Community leaders assert that regional authorities tried to minimise the importance of tremors prior to the disaster, thus hindering preventive and preparedness actions. Contemplating risks is always difficult, especially with a lack of information, but beyond this, it seems evident that the authorities minimised not only scientific evidence but also people's claims and concerns.

During the first days of the emergency prior to the eruption, SERNAGOMIN[26] tried to figure out the source of the tremors by flying over the nearest volcano, Michimahuida, 30 kilometres away from Chaitén (see Figure 5.11). The state service failed to identify the Chaitén volcano because there were no data or records about this volcano before then.

[26] The state institution responsible for evaluating natural hazards.

**Figure 5.11. Map of the Province of Palena**




*Source: elaborated by the author (2017); satellite image from Google Earth Pro (2016)*

This lack of accuracy in identifying the source of the quakes led to confusion among the authorities for some time until they decided that more investigations were required. After the eruption, the director of the volcanic programme at SERNAGEOMIN, Luis Lara, estimated that the last eruption of the Chaitén volcano may had occurred around 400 years previously; however, months later, reports from SERNAGEOMIN confirmed that the latest eruption of the Chaitén volcano may have occurred around 9,500 years ago (Covarrubias, 2008). In 2008, the Southern Andean Volcano Observatory (OVDAS) had no records on the existence of the Chaitén volcano, and therefore there were no related hazard maps, evacuation routes and emergency plans. OVDAS is the state technical institution part of SERNAGEOMIN whose task is to monitor and determine the most dangerous volcanoes in Chile. In the days after the eruption, SERNAGEOMIN and other researchers would call the Chaitén volcano a 'dormant volcano' or, in Spanish, *volcán dormido* (Dzierma and Wehrmann, 2012). Another community leader refers to this situation:

> "It was a feeling that the authorities and the specialists had no idea, really no idea [...] they were insisting that Michimahuida [the volcano] had erupted, so we were not at risk [...] the next day they discovered that was the Chaitén volcano, here! Just ten kilometres [from the city] […] we were lucky we had time to run".
>
> (Angela Rodriguez, female, Community leader, September 2013, interview)

In these interview extracts, it is possible to observe a conflict between residents and the authority on evaluating government reactions in the early days. The initial government reaction is crucial to understanding *Chaiteninos*' post-disaster erosion of trust of national authorities, which progressed alongside the evacuation, recovery, relocation and reconstruction. This erosion of trust in authorities is considered here an unsafe condition, as a lack of trust can negatively alter future DRM and DRR actions, as well as lessening the effects of compensatory and recovery policies (Cutter et al., 2003). I will corroborate this with more evidence when reviewing the rest of the policy responses to the disaster. This includes the compensatory strategy, the relocation of Chaitén and reconstruction.

Another reflection from those first days is how quickly regional authorities – especially the *Intendente* Sergio Galilea– took control over the emergency, which tells us about the verticality of the model of DRM. This is coherent with Mena's observations (2016) about how often disaster emergencies in Chile tend to be treated by authorities in the upper levels of government.

The next section reviews how decision-making about the evacuation and the constitution of the national COE can be considered powerful examples of the top-down approach during emergencies in Chile, and how this approach may affect vulnerability in the future.

### 5.2.2 The emergency response and evacuation

According to a consultancy project (PUC et al., 2009), tremors related to the eruption of Chaitén volcano started on April 30, 2008, and were perceived by the inhabitants in Chaitén, Futaleufu and Palena. These quakes culminated in a violent

eruption at 11:38PM on May 1, 2008. The first official statement asserted that the eruption belonged to the Michimahuida volcano, continuing the hypothesis established by technicians and authorities since the beginning of the tremors. However, overflights the next morning confirmed that the rash of activity corresponded to an unknown volcano, which was immediately named 'Chaitén'. Given such circumstances, the national ONEMI office declared an administrative red alert, allowing the evacuation of Chaitén and other towns and villages affected by ash fall in the Province of Palena. It is not clear if the ONEMI considered the opinion of the local/regional COE or bypassed its authority in this regard, however, most of the local authorities interviewed agree that they received the order from the ONEMI at national level. A municipal council member and an expert from the national ONEMI refer to this situation:

> "It was very late at night when we felt the eruption […] we met the Mayor and other authorities at the Municipality […] [the regional] COE was in charge of all decisions but there was nothing to consider, the risk was evident; we did not take care where the order came from, we just wanted to be evacuated".
>
> (Mauricio Poblete, male, Local government council member, July 2013, interview)

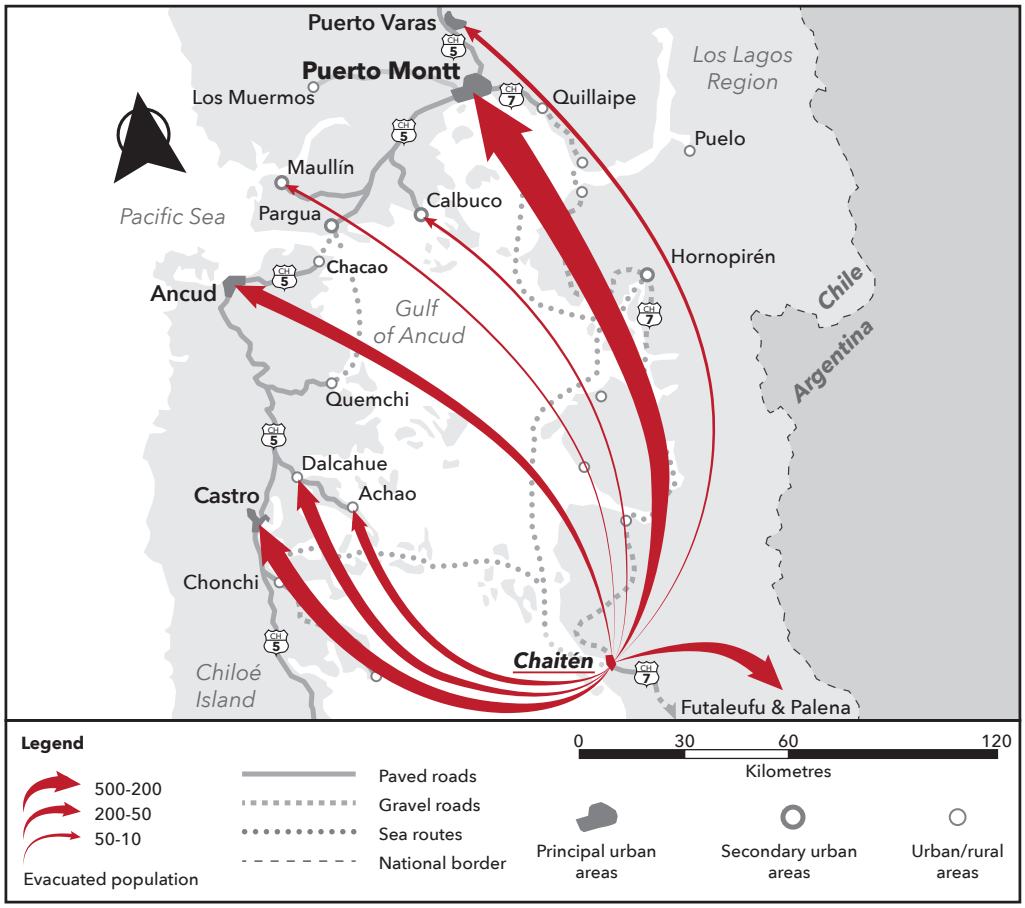
> "The Minister Perez Yoma [Ministry of Interior] decided on the evacuation when he saw all the information [...] reports from the Army, SERNAGEOMIN [...] all technical information said Chaitén must be evacuated, so he declared the evacuation".
>
> (Victor Sanhueza, male, National government official, April 2013, interview)

From these interviews and the consultancy report (PUC et al., 2009), the idea emerges that decision-making was, from the very beginning of the emergency, the responsibility of the national authorities, either in the figure of the Minister of Interior or the ONEMI in Santiago. Beyond the discussion about local capacity to deal with the emergency, during the rest of the post-disaster phases, people and local authorities claimed more participation in decision-making. Despite the claims, the top-down approach persisted throughout the recovery process, and this had a negative impact on people's trust in authorities. I further argue here that such a top-

down approach would not have been counteracted or balanced easily by locals' actions, as the nature of the decision-making and political power –reflected in the state territorial organisation– was highly centralised. This will be corroborated later in the next section when reviewing some community mobilisation against the central government.

In the first 24 hours after the eruption, more than 4,101 inhabitants were evacuated, mainly by sea routes aboard Navy and private ships that were in the surroundings (Presidencia de la República de Chile and Narváez, 2009). By the second day of evacuation, a total of 8,119 people were displaced. Figure 5.12 shows the geographical distribution of the most important destinations for the evacuees.

**Figure 5.12. Evacuees' destinations from Chaitén, May 2-4, 2008**




*Source: elaborated by the author (2017), based on Presidencia de la República de Chile (2008a)*

One of the most relevant aspects that emerged during the interviews in relation to the evacuation process and the production of vulnerability is something I call the 'erosion of trust in authorities'. Disaster literature establishes trust in authorities as a very important aspect of prevention, especially when preparing people in case of evacuations and for developing DRM and DRR strategies (Cutter et al., 2003). This erosion of trust could have been initiated as a result of the false interpretations of the volcanic hazard by specialists and authorities, and exacerbated by the way in which the evacuation was conducted. Two community leaders refer to this.

> "The evacuation was a mess [...] they [the authorities] sent children and mothers to one city and fathers to another [...] many did not know where the others were for weeks. [...] In case of a new evacuation, I will stand firm here. I will not leave my land, my house [...] I will not let them take me anywhere. I prefer to die here than to live how we lived during our time in Puerto Montt [city where she was evacuated with her family]".
>
> (Roberta Monsalvez, female, Community leader, July 2013, interview)

> "We lost all our personal belongings [referring to pictures, memories, personal valuables] because they told us that we would come back in few weeks [...] many left their animals and pets; they all died because we trusted we could come back".
>
> (Marcela Segovia, female, Community leader, July 2013, interview)

From the above, is possible to identify two negative and still painful issues in relation to the evacuation. The first refers to the splitting of families, the second to the possibility of returning to the city few days after the evacuation.

Families were split. Women and children were evacuated first, followed by men. *Chaiteninos* had no means of knowing where their family members were, being unable to communicate with one another during the first days, and this created anxiety and uncertainty. This also provides evidence that evacuees' destinations were not pre-established: nor was there a prepared plan of action for the evacuation. Furthermore, the existing social organisation was somehow disarticulated and there were no interlocutors able to represent the dispersed

population or to establish communication with regional and local authorities (Mardones et al., 2011). As observed here, in the presence of high risk or the occurrence of a disaster, the evacuation operated under a universal driver: life saving and the provision of basic subsistence for the affected populations. However, ensuring the right to information and the continuity of daily life for those displaced appears not to have been addressed as a policy response. A multi-scalar perspective on this could tell us that the sudden evacuation was indeed nested in distant processes and underlying causes. The evacuation strategy followed a distinct pattern of life saving and reduction of losses. These, as a rule of thumb, are found recurrently in the ONEMI documents consulted on emergency management, and this prevalence makes it appear as if other elements of evacuation, such as the right to information, are unimportant. The ONEMI's main document, the National Plan of Civil Protection (ONEMI, 2002), refers to emergency responses as follows:

> "Emergency responses is action carried out immediately after a destructive event. Its principal aim is to save life, and reduce impacts and losses. Examples: search and rescue, medical assistance, evacuation, temporal shelter, food supply and shelter".
>
> (ONEMI, 2002, p.28)

From this extract and the way in which the evacuation was conducted in Chaitén, it is evident that the lack of attention to other aspects of emergency response, such as the right to information and participation, reflect the reactiveness of the DRM model. This idea, directed from the ONEMI national office down to local authorities and practitioners, may explain the reaction of authorities during the evacuation in terms of both the lack of preparation in terms of destinations of evacuees and the subsequent splitting up of families that occurred.

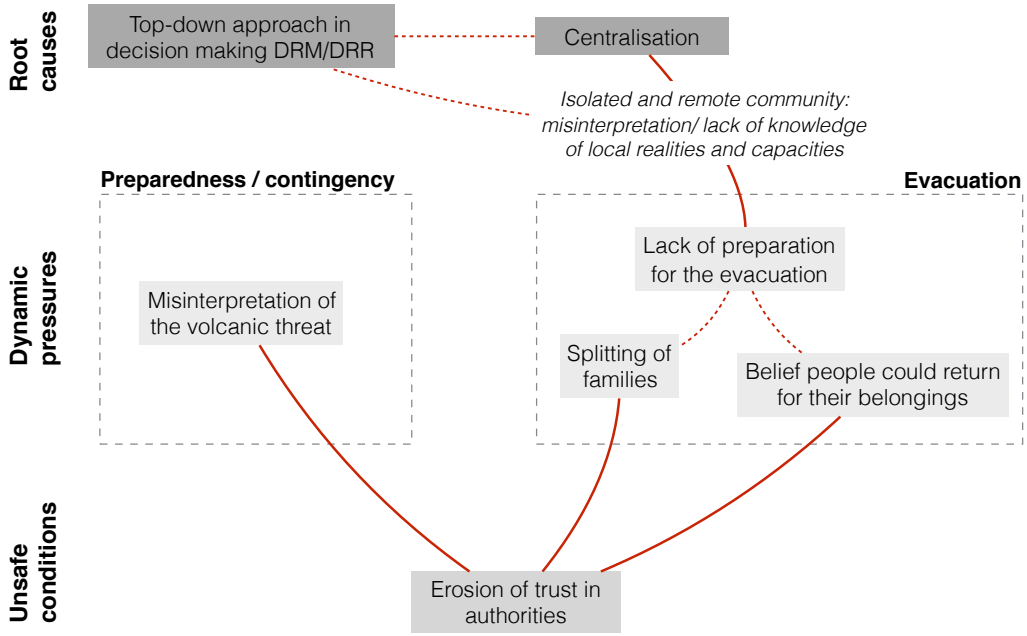
A second conflicting issue regarding the evacuation was the possibility of returning to the city a few days after the evacuation. The interviews above point out that people were told that the evacuation would last for a maximum of two weeks. However, most would never return to their homes for their belongings and valuables. By May 6, 2008, the national authorities decided that the exclusion zone –

i.e. the commune of Chaitén– would last for an unspecified length of time. Many *Chaiteninos* felt anxious about the future of their houses and animals and livelihoods, and many regretted having believed in the authorities. From these views, is also possible to perceive a feeling of abandonment and distance from the authorities.

Finally, other issues arose in relation to the allocation of emergency and response resources. An audit issued by the General Accounting Office or *Contraloría General de la República* in 2009 revealed that an undetermined number of state agencies and departments received emergency funds to alleviate the impacts of the disaster in Chaitén between 2008 and 2009. Some of the recognised government bodies include the SUBDERE, the Municipality of Chaitén, the regional government of Los Lagos Region, the National Institute for Agricultural and Livestock Development (INDAP), the National Service for Training and Employment (SENCE) and the Service of Technical Cooperation (SERCOTEC), among others. The inter-ministerial interest in supporting Chaitén was evident but not necessarily planned beforehand. The audit pointed out irregularities in the way the emergency funds were allocated, distributed and spent by public and private companies (Contraloría General de la República, 2009). For instance, private donors such as the retailers Cencosud S.A. and Walmart Chile and others, and energy and food companies such as Lipigas and Colun are highlighted in the report because their donations could not be traced to the intended destinations. The concern about these 'irregularities' is that the above-mentioned companies received tax exemptions through their donations, and not all public money was accounted for, as reported in the audit. And yet the cost of the emergency seems ambiguous. According to the annual account prepared in 2009 by the *Intendente* of Los Lagos Region, Sergio Galilea, the total cost of the emergency was around US$ 61 million (Galilea, 2009), while in the annual account produced by the national government it reached about US$ 78.5 million (Presidencia de la República de Chile and Narváez, 2009). Thus, accountability emerged as an issue informing and contributing to the mistrust towards authorities and the private sector. For *Chaiteninos* and its local authorities, the real cost of the recovery has never been clarified.

Figure 5.13 below illustrates the connections between the elements discussed so far in the chapter and it situates them within the continuum of vulnerability progression: root causes → dynamic pressures → unsafe conditions. The connections and elements are not definitive at this stage, but they attempt to guide the storyline of the case. I will explore other elements and strengthen the existing ones with the analysis of other policy responses in the next sections.

**Figure 5.13.**
**Progression diagram of vulnerability drivers during the early response in Chaitén**



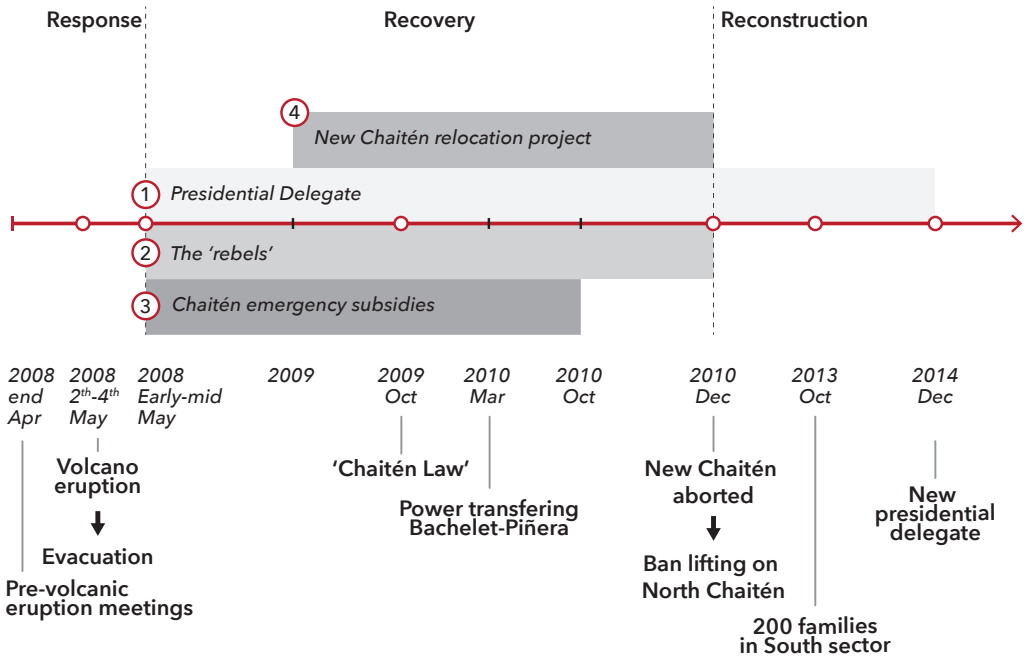

So far we have seen how a potential erosion of trust in authorities started to take shape among *Chaiteninos* regarding the way in which the state and DRM institutions dealt with the emergency. In particular, the splitting of families and the false promise of an early return to the city created anxiety and expectations that were not met. It seems that the lack of preparation and awareness of the local capacities and realities is part of how the model understands evacuations –that is, only as a matter of life saving and reducing losses. Furthermore, the top-down and centralised decision-making within the DRM may have contributed to the limited integration of local capacities and aspirations. Most of the decisions were made in Santiago, opening a breach between *Chaiteninos* and the authority. The distances between *Chaiteninos*,

regional and national authorities were increased by the creation of a parallel authority named the Presidential Delegate for the Chaitén recovery. This designation represents a new phase in the storyline of the case and is when the recovery process starts.

## 5.3 Recovery and relocation of Chaitén

In order to examine the recovery phase, the timeline below in Figure 5.14 introduces, in order, the elements that will be discussed in the following sub-sections.

**Figure 5.14. Distribution of policy responses in the Chaitén disaster**




This figure explains that certain processes in the recovery took place simultaneously: the Presidential Delegate, the formation of a group of rebels, the emergency subsidies and the relocation of Chaitén. The analysis begins with those elements that I assume to have triggered or influenced the development of others. The numbers within red circles show the sequence I will follow in this section. Other events displayed in the timeline, such as the Chaitén Law, are addressed within the analysis of the mentioned recovery processes.

### 5.3.1 Friction between national and local decision-making

On May 9, 2008, President Bachelet designated Paula Narváez the Presidential Delegate for Chaitén to coordinate the recovery and a possible relocation of Chaitén. This designation created friction between regional and national governments and the people of Chaitén. Officials from the national, regional and local governments refer to this designation and her role:

> "Paula Narváez was designated as Presidential Delegate because was a figure we used successfully in the previous disaster of Tocopilla [2007 earthquake] [...] the idea of the delegate is to 'reduce' the distance between the central government and local needs [...] speed up the allocation of resources and support".
>
> (Noria Saavedra, female, National government official, August 2013, interview)
>
> "I remember she [Paula Narváez] came to Chaitén with the media and other people to convince us that Chaitén must be abandoned [...] we organised a big demonstration [around 200 people] because she did not want to defend us and Chaitén [...] many felt abandoned by the state".
>
> (Guillermo Ugarte, male, Local government council member, March 2013, interview)
>
> "It supposed that the Presidential Delegate was a technical authority; however, it was political [...] the roles of the *Intendente* and the Presidential Delegate overlapped in many cases –for instance, in the decision on the relocation".
>
> (Jacinto Tello, male, Regional government official, July 2013, interview)

These excerpts shows that the designation of the Presidential Delegate created some friction with regional and local public authorities. Narváez's appointment was issued by DS N°608, which states: "the Presidential Delegate, under the direct mandate of the President of the Republic, and in coordination with the *Intendente* of Los Lagos Region, assumes the direction of the recovery of Chaitén and, if necessary, its reconstruction" (Presidencia de la República de Chile, 2008b, p.2). However, the figure of the *Intendente* is the major representative of the President of the Republic in regions (Ministerio del Interior y Seguridad Pública, 2005). DS N°608 does not specify the command hierarchy and how coordination between these two

authorities, the Presidential Delegate and the *Intendente*, should take place. Perhaps for that reason, people perceived that the roles and responsibilities often overlapped. The tension between the local and national was perceived by *Chaiteninos* negatively, and animosity was centred on the figure of Paula Narváez. The media covered several confrontations between the Presidential Delegate Paula Narváez, the *Intendente* Sergio Galilea and the people of Chaitén. Here are some headlines:

- "Paula Narváez critiques *Chaiteninos'* demonstrations" by Cristina Cifuentes Flores. *La Tercera* [Newspaper]. February 5, 2009.
- "Government condemns *Chaiteninos'* demonstrations using Argentinean's flags" by Bárbara Covarrubias. *El Mercurio* [Newspaper]. February 5, 2009.
- "The other side of the tragedy" by Rodrigo Aguilera. *Revista NOS* [Magazine]. February 2009.
- "*Chaiteninos* and students demonstrate in Puerto Montt during the visit of the President Bachelet". *La Nación* [Newspaper]. June 26, 2008.

Thus, the coordination of recovery efforts, and somehow Chaitén's future, were at the mercy of the political agreements and dynamics between these two authorities. Nevertheless, both the *Intendente* and the Presidential Delegate were directly appointed by the President of the Republic and therefore subordinated to the national executive power, confirming the centralisation of decision-making in respect of disaster management.

However, centralisation found counteracting forces in the community that demanded more participation in the decision-making process. Several demonstrations took place in cities to which *Chaiteninos* had been evacuated. In Figure 5.15, the first photograph (left) shows *Chaiteninos* using Argentinean flags to protest against the visit of Paula Narváez to Chaitén, showing their disappointment in Chilean policies. The second photograph (right) shows *Chaiteninos* marching in Santiago for the rescue of pets and animals abandoned during the evacuation.

**Figure 5.15. Demonstrations of *Chaiteninos* in Chaitén and Santiago**


*Sources: (left) Cristina Cifuentes (February 2009) and (right) Daydalaus (July 2008)*

One particular group, called 'the rebels', or *los rebeldes*, by the media, needs to be addressed in this analysis as it represented a breaking point in relations between the local people and national plans in Chaitén. This group, and a series of actions initiated by other *Chaiteninos* throughout the recovery and reconstruction processes, are very important as they symbolise bottom-up attempts to negotiate Chaitén's future. This group also embodies *Chaiteninos'* agency to push for reforms and the capacity to cope with the disaster impacts.

### 5.3.2 The rebels: occupying Chaitén

Once evacuated and facing uncertainty about the future, some *Chaiteninos*, led by Patricia Troncoso,[27] banded together to form a collective action group named Sons and Friends of Chaitén, or *Hijos y Amigos de Chaitén*. This group aimed to communicate to the authorities their needs as well as their intention to return to the city. Due to the low impact they had on the media, the lack of attention from authorities and the uncertainty about the future, some of them decided to occupy Chaitén despite the existing ban. I interviewed Patricia Troncoso several times

[27] Fictitious name.

during 2013, and I accompanied her to visit other community leaders. They refer to the first days of the emergency as follows:

> "Nobody really told us what was next [...] whether we would come back to Chaitén or not, if we should start to find a job, nothing [...] during the first weeks we tried to organise something [civil organisation] to claim our rights, for answers [...] we organised a demonstration in Castro [Chiloé Island's capital] but it was funny because only a few of us turned up [...] nobody paid us attention".
>
> (Patricia Troncoso, female, Community leader, March 2013, interview)

> "Even the Senator Escalona [Chilean Socialist Party] came for a meeting with us, but he gave hugs, shook hands, and posed for pictures with [city] Castro's authorities only [...] it was really frustrating [...] so, we organised ourselves to visit Chaitén, to know about our valuables, animals and pets [...] we did not think twice. We settled back in Chaitén by late 2008".
>
> (Olga Pineda, female, Community leader, September 2013, interview)

From these interviews, it is possible to observe a sort of disorientation and uncertainty among *Chaiteninos* about what was happening with their houses and valuables right after the evacuation. The lack of information during the process and in the following days also reveals the poor integration of *Chaiteninos* in the recovery proceedings and their distance from powerful institutions and structures. Thus, some of them thought of organising something they called resistance, which included coming back to Chaitén despite the risks. The media named them 'the rebels' (Rojas, 2013). This 'emergent group' –in Quarantelli's terminology (1994)– was spontaneous in its formation, since at first there were only about five people who returned to Chaitén during the months following the eruption. This number grew over time, adding up to well more than twenty people by the end of 2008. The reasons for this returning include territorial rootedness, an inability to adapt and access to resources, among others (Ugarte and Salgado, 2014). However, their intentions converged on the idea of transmitting to their fellow citizens, and

especially to the public authorities, that Chaitén was not dead, alluding to Minster of Interior Edmundo Perez Yoma.[28]

As the interviewees described, living in the abandoned city meant they had to get potable water from a little stream to which they had connected water pipes, while energy was obtained from a diesel generator. People organised themselves to clean the streets and repair their houses. They also redefined their previous livelihoods into subsistence strategies to face the scarcity of goods and products available in the city, in light of there being no commerce or jobs available. As the interviewees said, these situations strengthen cohesiveness and the sense of community.

By mid-2009, the rebels' children were arriving in the city to meet their parents for holidays. However, when the regional authorities became aware of this, they decided to 'persuade' the rebels by ordering the Navy to bring children out of the occupied Chaitén, assuming their parents would follow them. Parents refused to abandon the city and sent the children away alone. Two rebels referred to this situation as follows:

> "I had to send my 13 year old daughter alone in that ship [a Navy ship] [...] I cried for several hours and days until I knew she was good in the house of my brother in Puerto Montt".
>
> (Olga Pineda, female, Community leader, September 2013, interview)

> "The strategy of the government to take us out of the city was by pushing us with our children. That was cruel [...] they [government officials] argued that we are adults so we can decide to stay in the city despite the risks, but children are another story, children are a 'state responsibility' [...] We were treated as if we were irresponsible parents".
>
> (Margarita Salamanca, female, Community leader, September 2013, interview)

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[28] On February 20, 2009, the Minister of Interior Edmundo Perez Yoma announced "Chaitén, unfortunately, is dead", asserting that there would not be investment of any kind in the city (La Nación, 2009).

That government move bothered people even more. For many *Chaiteninos*, especially those living already in Chaitén, the regional and national government had become the main obstacle to them recovering their livelihoods. Remember that during the emergency all people were forced to evacuate the city according to the national emergency plan, without considering either local knowledge or their social and family structure. *Chaiteninos* were sent to neighbouring cities, such as Puerto Montt, Castro and Coyhaique, with very different urban lives, social structures and economies, with a greater degree of difference than those found in Chaitén prior to the eruption –such as extended family relations and a sense of community rooted in the territory (Marchant, 2010).

The rebels became the voice of Chaitén's dispersed population, the only social organisation that fought against national plans. Furthermore, communication between *Chaiteninos* within and outside the city was possible thanks to a radio programme named Here Chaitén, or '*Aquí Chaitén*', led by Pablo Carcamo.[29] The programme was broadcast from Chaitén itself and was picked up by other radio stations in the region. According to Pablo, the programme "sought to encourage other *Chaiteninos* not to forget our land, to fight for it [...] to face the government" (Pablo Carcamo, male, Community leader, March 2013, interview). Despite such difficulties, the 'settlers'[30] adapted to the new situation while encouraging other *Chaiteninos* to return. By mid-2009, when the ban was still in force, some rebels perceived others living outside Chaitén to be expatriated, or *exiliados*, people 'forced' to leave Chaitén, revealing their strong conviction that it was not their decision to abandon Chaitén.

After observing such struggles, it is possible to argue that the return process finds justification in the uncertainty surrounding the recovery plan –if we can call it that (see section 5.3.3, page 212)– and the lack of attention and of participation in decision-making. The feeling of abandonment after the evacuation, and later the

[29] Fictitious name.

[30] This is what *Chaiteninos* call the people that decided to come back to Chaitén after the eruption.

impression of fighting against the state's intentions to leave the city behind, encouraged them to take the lead. It is therefore possible to identify two clear and antagonistic stances on Chaitén's future. The first was the government's position on the impossibility of repopulating Chaitén, based on the early technical risk assessments (PUC et al., 2009), and the second position, represented by the rebels, affirmed that Chaitén was not dead. Certainly, this group has played an important role in the recent history of Chaitén by actively participating in the processes that resulted in the recognition of Chaitén as a habitable city in 2010. But before moving towards that episode, let us review the various twists brought about by the central government that could have triggered that end: the city relocation project, called the 'New Chaitén'; the presidential change in March 2010, including the regional *Intendente*; and the compensatory strategy, including benefits and subsidies. The latter is the focus of the next section.

### 5.3.3 Compensation, benefits and subsidies

On May 2, 2008, Chaitén was declared a catastrophe zone through DS N°588, signed by the President of the Republic (Ministerio del Interior y Seguridad Pública, 2008). In Chile, only the President of the Republic can declare a State of Catastrophe –which is one of the States of Constitutional Exception.[31] This resolution was applicable for one year –i.e. until May 2, 2009– and could be extended for an equivalent amount of time. In Chaitén, it was in force until May 2010. During that period, a still undetermined amount of public and private resources (Contraloría General de la República, 2009) was allocated to government services and organisations to support the displaced population and its recovery.

According to government officials and government records (Presidencia de la República de Chile, 2008a), the main measure implemented to support people was the Chaitén Emergency Subsidy, or *Bono Emergencia Chaitén*. This *bono* involved a

[31] As reviewed in Chapter Four, in a State of Catastrophe, the President of the Republic may authorise the direct allocation of resources to alleviate people suffering and provide relief (República de Chile, 1980).

monthly payment of up to US$ 1,000 per family and was awarded between May 2008 and October 2010. During the first year, more than 3,200 families benefited from it, and about 1,800 families in the second and third years. Other compensatory subsidies were given to farmers and producers, alongside grants for education. Between 2008 and 2009, the National Institute for Agricultural and Livestock Development (INDAP) allocated US$ 1.2 million in order to compensate for the losses of approximately 1,100 producers (INDAP, 2009). Another important compensatory measure was delivered in the form of housing subsidies: 2,235 families received a one-off housing subsidy of about US$ 20,000 each (GORE Los Lagos, 2009a). The housing subsidy aimed to offer special financial support to displaced people from Chaitén to resettle them in other cities such as Castro, Puerto Montt and Puerto Varas. In some places, such as in Puerto Varas, a brand new neighbourhood was constructed with the purpose of receiving several displaced *Chaiteninos* (MINVU, 2008). Likewise, other subsidies for entrepreneurship and psychological support were given (GORE Los Lagos 2009a, 2010; Presidencia de la República de Chile and Narváez, 2009). Some collected testimonies from government officials and the community refer to this support:

> "I was responsible for supporting the allocation of the *bono* in the Province of Palena [...] basically there was no supervision and there were many problems in knowing whether we were helping people or not [...] Prior to 2008, people used to live with so much less [...] When they received that amount of money, some people wasted it on holidays, travelling and expensive clothing".
>
> (Karina Navarrete, female, Local government official, July 2013, interview).

> "I received the housing subsidy to get a home in Puerto Montt [...] It was not easy. We got a house very far away from the city centre [her place of work], so not well connected [...] when we heard about the return [to Chaitén] we did the impossible and came back to Chaitén".
>
> (Angela Rodriguez, female, Community leader, September 2013, interview)

As clearly set out by the first interviewee, poor supervision in the allocation of resources is evident. This may have produced some unforeseen effects on people's

ability to cope with the disaster impacts. According to the interviewed provincial officer above, people relied on benefits for two years almost without supervision, with an amount of money that exceeded their incomes prior the eruption in 2008. When benefits ran out, most people found themselves without savings and with debts (Paz, 2011; Sáez, 2009). This lack of supervision and the misuse of recovery benefits, as well as financial debts and the fact that Chaitén was already people encouraging to return, seemed powerful reasons to repopulate Chaitén.

Such poor supervision was not only limited to people, but also to government services and the private sector. The lack of supervision and other irregularities were detected by an audit commissioned by the General Accounting Office (Contraloría General de la República, 2009) and covered later by the media (René González, 2014). This could have further eroded people's trust in the authorities. Two audits found the regional government and the Municipality of Chaitén failing to allocate and supervise subsidies and benefits (Contraloría General de la República, 2009; 2011). The perception of Angela Rodriguez (interview excerpt above) also reflects how subsidies and benefits failed to support *Chaiteninos* transitioning from their previous lifestyles and livelihoods to new ones. Although there are no exact figures, authorities assert that most of the current population residing in Chaitén today – about 4,500 people in total– returned to the city because they were not able to adapt to the new urban life and/or they missed the Chaitén lifestyle. Something similar was found by Ugarte and Salgado (2014).

As a part of the national government's strategy to encourage people to leave Chaitén, Law N°20,385, or the Chaitén Law, was promulgated in October 2009. This special law allowed the state to purchase properties, paying the market price prior to the eruption. According to experts and local authorities interviewed, this strategy's objective was twofold: on the one hand, it had to restrict the habitability and occupancy of Chaitén because of its high risk; on the other hand, it was a way to compensate for the losses of the affected population by transferring more financial resources to them. Once the Chaitén Law was approved, the state bought 889

properties for a total of US$ 30 million (Senado de la República de Chile, 2013). By the end of 2010, when the new central government of Sebastian Piñera decided to lift the ban on inhabiting Chaitén, more than 80 per cent of the housing stock in Chaitén was public property. As only the North sector of Chaitén was declared habitable, about 70 housing units were rented to returning *Chaiteninos*. Other *Chaiteninos* who had not sold their properties via the Chaitén Law re-occupied their own houses. Forty-nine properties were assigned to public offices (El Mercurio, 2013). In contrast, residing in the South sector was still prohibited, so there was no permission to rent and buy back properties. Such restriction was contested by about 200 families living informally in the South sector, and by North residents, as they have persistently claimed that they are one city (Rojas, 2013) (see Figure 5.16).

**Figure 5.16. Demonstration on the Rio Blanco Bridge, blocking the Austral Highway in protest at the delay of solutions for the South sector**

*Source: Local newspaper El Huemúl (2013)*

The Chaitén Law created conflicts that persist today, as it aimed to compensate and persuade the population definitively to leave the city. It compensated losses but it failed in persuading people to leave. The fact that Southern residents of Chaitén lived in a permanent state of uncertainty –they still did not know whether the South sector will be habitable in the future or not– in addition to their inability to live

formally in the area, either renting or purchasing a house, may have limited their possibility of securing more sustainable livelihoods by restricting their access to urban services and institutional support. As discussed earlier, this limited access to services and opportunities has sustained the uneven distribution of risks (see Figure 5.17) between the two sectors of the city.

**Figure 5.17. Progression diagram of vulnerability drivers during the recovery of Chaitén**

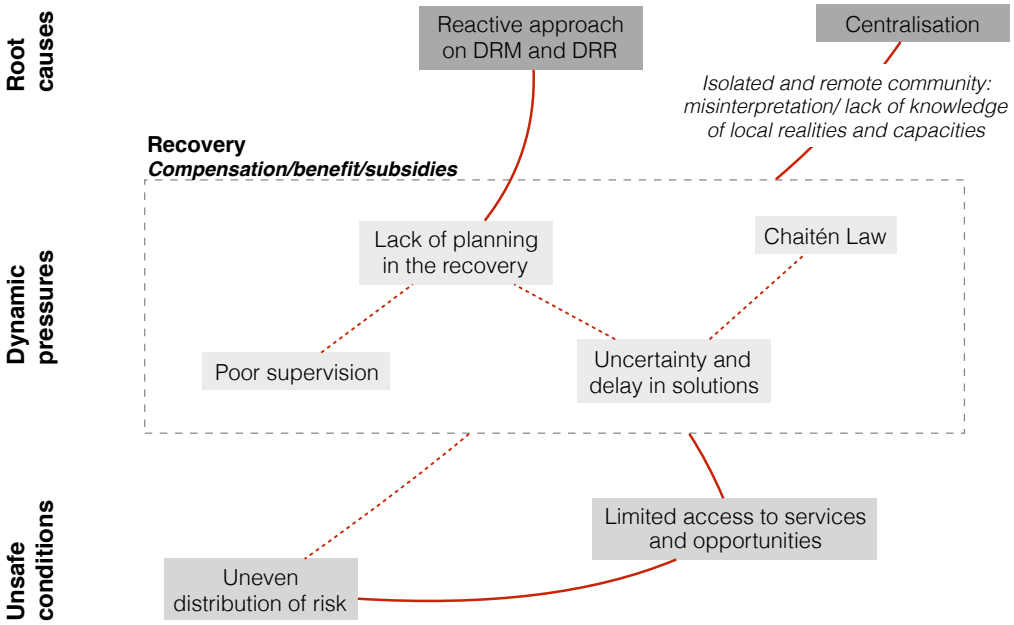



Figure 5.17 explains how the historically configured and reactive approach of DRM in Chile may have mediated the lack of long-term planning in this recovery phase. From this, it is possible to observe that the delivery of benefits and subsidies has not followed a comprehensive strategy: rather, it has been limited to the transfer of resources. Subsidies and compensation, for almost two years from 2008 until 2010, have not by themselves served to secure livelihoods and safer conditions for *Chaiteninos*. On the contrary, the lack of long-term planning and uncertainty seems to have contributed to the uneven exposure of the North and South sectors, enabling the restitution of urban life in the North sector but abandoning the South. In my view, the series of largely uncoordinated government manoeuvres aimed to reduce suffering and give more opportunities to the affected people, but the lack of

a long-term strategy for recovery and the poor supervision had unforeseen effects and perhaps contributed to the production of unsafe conditions in Chaitén. For instance, the absence of a clear policy on the South sector that went beyond the simple prohibition of inhabitancy may have encouraged the informal settlement of that area which, because of its exposure and lack of disaster risk reduction measures, is at risk. However, this conclusion cannot be arrived at by considering the delivery of subsidies alone: it requires analysis of other mutually influential processes that were ongoing in parallel, such as the presidential change in March in 2010 and the city relocation process initiated in mid-2009. The latter is addressed in the following section.

### 5.3.4 The new Chaitén: the city relocation process

Just after the evacuation of Chaitén in 2008, two research groups started individually to collect data in order to consider possible solutions for Chaitén. One group was from the Observatory of Cities (OC) from the Pontificia Universidad Católica de Chile (PUC), the other from the Universidad Austral de Chile (UACh). These two groups, plus the national architecture firm Elemental and the international consulting office ARUP, developed the idea of relocating the city of Chaitén by mid-2009. I interviewed several researchers and officials who participated in the process from the PUC and UACh, and the Urban Development Division (DDU) of the Ministry of Housing and Urbanism (MINVU).

By October of 2008, and after several negotiations with the above-mentioned actors, the national government signed a contract named *Consultancy for the Development of Strategic Guidelines of Reconstruction/Re-localisation and Conceptual Master Plan Post-Disaster Chaitén* (GORE Los Lagos, 2009b). The consultancy project was led by the PUC team and planned in three stages between June 2008 and July 2009.[32] The first report (PUC et al., 2008a) was delivered in

[32] The consultancy contract had a total cost of US$ 321,000 (GORE Los Lagos, 2009b), which can be included within the overall government expenditure on the Chaitén disaster.

October 2008 and included a characterisation of Chaitén, the Province of Palena and Los Lagos Region.

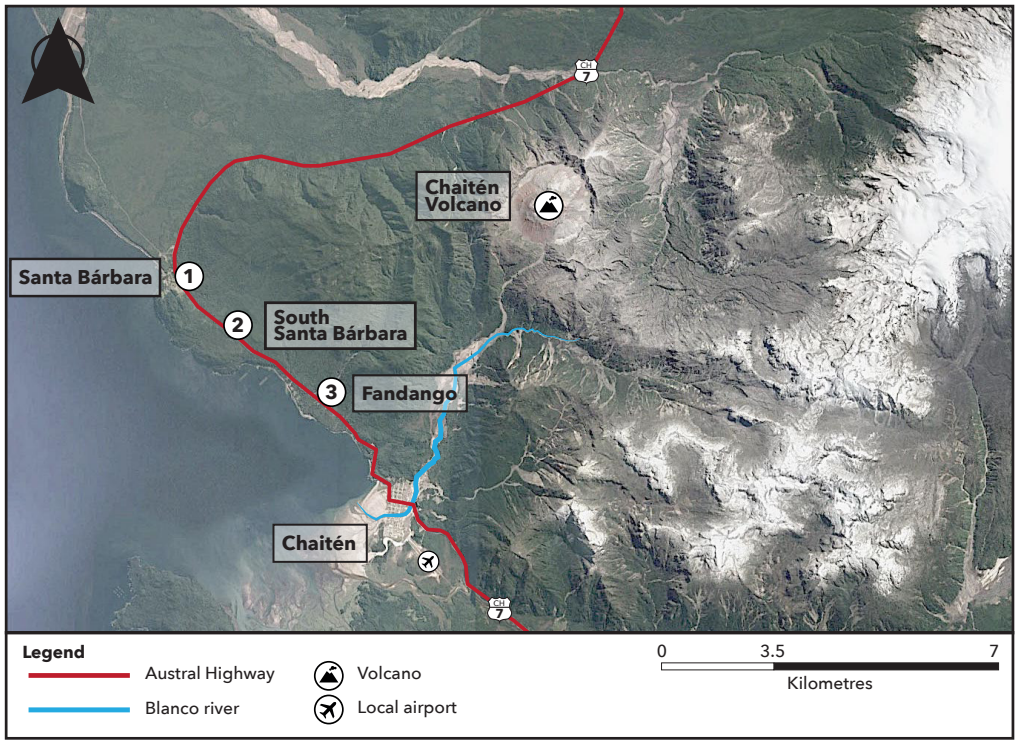
The second report (PUC et al., 2008b) was delivered in December 2008 and focused on the evaluation of alternatives for Chaitén. The evaluation involved a feasibility assessment on the relocation and/or reconstruction of the city. Based on technical calculations and development estimations such as economic potential and hazard exposure, the second report openly recommended the relocation of Chaitén to a safer area. From this point, the relocation project was called New Chaitén. The report included a planning-political strategy to lead the process. This strategy offered a 'recipe' (PUC et al., 2008b, pp.121-125) to the government on how to present the relocation project to *Chaiteninos* and the general public, based on:

- Community participation built on people's need and ambitions
- Justifying the relocation of the city by arguing that the threats were permanent, giving them 'good' alternatives through relocation such as better housing, employment, health assistance, and so forth
- Respecting the right to information
- Not lying or speculating about future actions
- Strict use and management of information

Looking back now, from the perspective of almost night years after this report, it is possible to observe that most of these recommendations were not followed as expected. Simply the declaration made by the Ministry of Interior Perez Yoma that "Chaitén, unfortunately, is dead" in 2009 is powerful evidence of how information was managed, and how decision-making occurred. Many times the interviewed *Chaiteninos* complained about the lack of transparency and participation, the delayed replies or the absence of answers from authorities, and the lack of attention paid to their needs and claims.

In June 2009, the third and final report (PUC et al., 2009) was delivered. This report stressed the relocation of Chaitén by assessing various alternatives for the new city in Santa Barbara, Fandango and Bahía Pumalín (see Figure 5.18). This shows that the alternative of reconstructing and repopulating Chaitén was completely discarded by the consultants because of its high economic and social cost.

**Figure 5.18. Location alternatives for the New Chaitén**




*Source: elaborated by the author (2017); satellite image from Google Earth Pro (2016)*

The conclusions of the consultancy report significantly influenced authorities and decision-makers. Considering the relocation, two officials who participated in the design of the New Chaitén master plan made the following comments:

> "The relocation of the city to a safer area did not seem significant to most *Chaiteninos* interviewed in the consultancy project if they were assured that their culture, history and lifestyle would be respected […] people wanted solutions and we worked hard and fast to deliver it".
>
> (Benjamin Vergara, male, National expert and national government official, April 2013, interview)

> "Technical and planning reports [referring to the consultancy report late 2008] indicated clearly what to do [...] there was no doubt that Chaitén had to be relocated".
>
> (Jose Morales, male, National government official, May 2013, interview)

Here it is possible to observe that there was an assumption about the people's acceptance of the relocation. Clearly, something happened in the process, as by mid-2009 there were almost 500 people living in Chaitén despite the ban and the volcanic hazard. The New Chaitén Master Plan document issued by MINVU (2010) claims that 257 *Chaiteninos* participated in the relocation and design process, which represents about three per cent of the evacuated population of about 8,000. All participants were *Chaiteninos* living out of Chaitén, while *Chaiteninos* in the city and 'the rebels' were not consulted. From this perspective, the central government's agenda was a bit clearer, as was its view on the direction of future events. For the central government, the New Chaitén must be realised. This determination may have influenced subsequent actions in respect of the implementation of the New Chaitén project, with a clear top-down approach. These will be reviewed below.

By mid-2009, Chile was initiating the presidential candidates' campaigns for the elections in December that year. The Chaitén disaster featured several times in the election process and in televised debates (ANATEL, 2010). It marked the end of the Bachelet administration. An expert planner who participated in the design of the New Chaitén master plan referred to this moment:

> "So, once they [consultancy members] gave the advice of relocating Chaitén, then MINVU decided to assume internally –that is, in-house– the development of the master plan, with a specific and dedicated team for this task. […] This team included SEREMI,[33] municipality of Chaitén and other departmental ministry offices. [...] it started with the conclusion of the [consultancy] report –that is, Chaitén must be relocated northward, to a safer area, and on the coastline in order not to lose the existing maritime routes. [...] Finally, the master plan of the New Chaitén was not tendered because if they [MINVU] did so, Bachelet's administration would

[33] Regional Ministerial Secretaries (in Spanish, *Secretaría Regional Ministerial*, or SEREMI) are regional delegations of national ministries such as for health, education, defence and so forth.

> run out before that we could finish the process, so it [the master plan] had to be done quickly [...] Making it quick influenced the whole process: there was a lot of pressure [...] This decision neglected the idea that master plans are participatory planning processes, including different sectors of society. […] By then, Bachelet's administration had less than a year to the end of its term".
>
> (Benjamin Vergara, male, National expert and national government official, June 2013, interview)

From this excerpt, is possible to observe how the political moment and time constraints added pressure to the master plan and the recovery process. This affected *Chaiteninos* in different ways in terms of their participation and subsequent engagement with the relocation project. When the government's view on the recovery is contrasted with the views of the rebels, the distance between the state and the locality becomes more evident, and the top-down approach applied. As Figure 5.19 shows, by March 2010, Santa Barbara[34] already had a police station and a field office for the Navy, as well as basic urban infrastructure for electricity, water and telecommunications. The progress in Santa Barbara prior to the public presentation of the master plan in March 2010 reflects the pressure from the central government to deliver a solution to the Chaitén disaster.

[34] The selected location for the New Chaitén.

**Figure 5.19. Santa Barbara station to initiate the New Chaitén**

*Sources: Bernardo Valdes (MINVU, 2010) and Verónica Veloso (May, 2009)*

**Figure 5.20. Design proposals for the New Chaitén**

*Source: MINVU (2010)*

According to an urban planner interviewed in 2013, who was consulted by the urban division team at MINVU, the New Chaitén master plan involved idealistic views about sustainability and modernity which idealise the New Chaitén project as a unique opportunity to create an energetically efficient, resilient and vibrant city.

These views are reflected in the pictures in Figure 5.20, which were selected from the master plan document (MINVU, 2010). An urban practitioner and a community leader who attended an 'informative' meeting (Cifuentes, 2009) in February 2010 in Puerto Montt, aiming to communicate to people the process of relocation, refer to the presentation of the New Chaitén master plan:

> "For the government, it was very important to achieve approval [by *Chaiteninos*] of the project before the presidential transition [March 11, 2010] [...] they wanted to initiate a dialogue with the people in Chaitén [...] but many were disappointed because the project was in a very early stage [...] they [the government] projected a process of two or three years; the people did not want to wait more and many knew about *Chaiteninos* already living in Chaitén".
>
> (Gabriela Miranda, female, National consultant and planner, July 2013, interview)

> "Finally, it was something they [the government] stubbornly wanted to do, against everything [...] they wanted us to wait, like, three years more. No, impossible to accept that [...] they spent so much, much money [...] Mr Galilea did many things wrong and Bachelet too [...] they played with us".
>
> (Patricia Troncoso, female, Community leader, September 2013, interview)

Here is possible to observe how frictions between the government and community about the relocation and the New Chaitén became more intense, in part because of the delay –the relocation project was launched almost two years after the disaster– but also because the process would need two or three additional years. This eroded people's trust in the Bachelet administration, something that was reflected in the presidential elections in December 2009.[35] Weeks later, these delays would confirm people's refusal to be relocated, as this and other circumstances precipitated the

[35] Piñera won the presidential election in the commune with 51.14 per cent of the votes. *Chaiteninos* were able to vote from other jurisdictions (SERVEL, 2017).

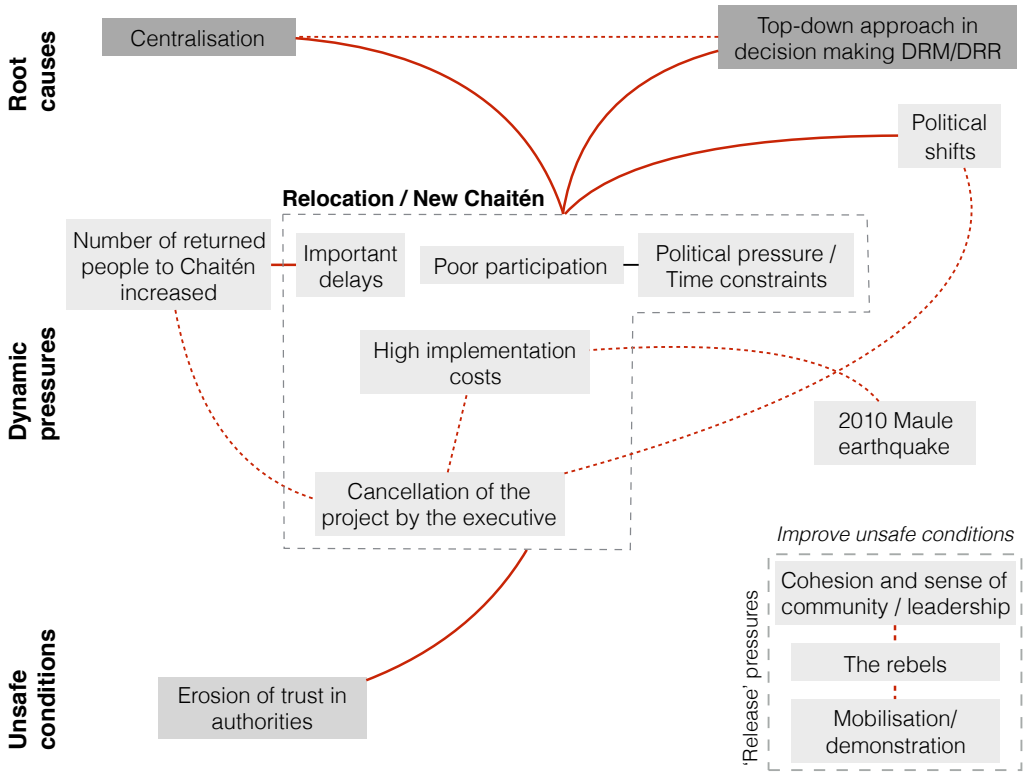
cancellation of the New Chaitén. Some of the circumstances include the presidential elections in 2009, the change of administration at national and regional levels in 2010, and the Maule earthquake the same year.

Some weeks after the presentation of the master plan, the national government of Sebastian Piñera took office on March 11, 2010. For first time since the dictatorship of Augusto Pinochet, from 1973–1990, a right-wing coalition was in power. It is worth mentioning here that before Piñera initiated his mandate, a massive earthquake of 8.8 magnitude struck central Chile on February 27, 2010, causing about US$ 30 billion in losses –20 per cent of the national GDP– and a final death toll of 525 people (Gobierno de Chile, 2014). While the new national government badly struggled with the social, economic and political impacts of the earthquake, plans for the New Chaitén started to fade. On one hand because its implementation costs rose to US$ 300 million, a too-high figure considering the upcoming reconstruction post-earthquake (Silva, 2010), and, on the other hand, because by March 2010 the number of people that had already returned to Chaitén had increased significantly from about 500 to 1500 (Rojas, 2013). Subsequently, on the second anniversary of the Chaitén disaster, May 2, 2010, the newly appointed *Intendente* of Los Lagos Region, Juan Montes, announced the cancellation of the New Chaitén project, arguing its costs and its rejection by *Chaiteninos* (Municipalidad de Chaitén, 2011b).

The political shifts, the 2010 Maule earthquake, the refusal of the population and the fact that a significant number of people had already returned to the city despite the ban, may have influenced the failure of the New Chaitén project. Likewise, the way in which the design of the New Chaitén was conducted –particularly in terms of the lack of participation– may have affected people's trust in the authorities. Several of the interviewed *Chaiteninos* saw a waste of resources and time in the project, and they blamed both the state and the regional and national authorities for that. Another aspect worth noting here is that the recovery strategy was organised vertically, and thereby intentionally or unintentionally neglected the participation of the community, or at least that of regional and local authorities, because of the

overlapping role with the Presidential Delegate. This verticality is congruent with the observations made regarding the territorial structure of the Chilean state and the model of DRM. Figure 5.21 aims to capture the progression of vulnerability in respect of the elements discussed in this section.

**Figure 5.21. Progression diagram of vulnerability drivers during the relocation in Chaitén**




In the diagram above we can see how low inclusion of *Chaiteninos* in the design phase, along with time and political pressures because the Bachelet administration was coming to an end, helped to precipitate the cancellation of the city relocation. Significant delays in the project and the definitive abandonment of the New Chaitén may have also contributed to erode people's trust in national authorities even more. Likewise, the 2010 Maule earthquake added financial pressure, and the people that had already returned to the city despite the ban were a good excuse for the newly elected government to cancel the project and to decide definitively to reconstruct Chaitén. Likewise, it is worth mentioning that certain processes may have counteracted the progression of vulnerability, such as the sense of community and

cohesion that existed. These reflect existing capacities and characteristics in the community that may result in resilient actions in the future.

The beginning of the Piñera administration in March 2010, however, deserves its own analysis, as the decision to cancel the New Chaitén project confronted national, regional and local authorities. These political confrontations, and a new political approach to the disaster recovery, evolved over time until finally Chaitén was declared habitable in December 2010.

### 5.3.5 Political shift on the Chaitén relocation

President Piñera began his tenure with the impact of the Maule 2010 earthquake and the tension resulting from the Chaitén people's struggle to stay in the historic location. This led to a political shift on the relocation of the city. An important aspect of this shift relates to the newly appointed *Intendente* of Los Lagos Region, Juan Montes. As explained earlier, *intendentes* are loyal bureaucrats of the President of the Republic who exercise the administration of regions in the country (Montecinos, 2005). In May 2008, then *Intendente* Galilea was loyal to the Bachelet administration as he participated actively in the meetings between local and regional authorities and Chaitén people, and actively defended the government's intention to relocate the city. However, just days after President Piñera took office, still in March 2010, Galilea was replaced by Juan Montes. Table 5.2 shows different *intendentes* of Los Lagos Region during the Bachelet and Piñera administrations. In grey colour is the period during which the New Chaitén project was negotiated.

**Table 5.2. *Intendentes* of Los Lagos Region 2006-2015**

| *Intendente* | Took office | Left office | President of the Republic |
|---|---|---|---|
| Jaime Bertin | March 11, 2006 | January 4, 2008 | Michelle Bachelet |
| Sergio Galliela | January 4, 2008 | March 11, 2010 | |
| Juan Montes | March 11, 2010 | November 15, 2012 | Sebastian Piñera |
| Jaime Brahm | November 15, 2012 | March 11, 2014 | |
| Nofal Abud | March 11, 2014 | July 13, 2015 | Michelle Bachelet |

*Compiled by the author (2017)*

Montes first visited Chaitén in March 2010, the same month he was appointed. A local government official and two community leaders who participated in his visit referred to the new approach:

> "Montes was shocked by the situation in Chaitén when he took office [...] People living without basic services, abandoned, and the [New Chaitén] master plan stuck".
>
> (Ignacio Saavedra, male, Local government official, March 2013, interview)

> "He [Montes] positioned himself into the idea that Chaitén should be repopulated, contradicting the decision of the previous and even the current [President Piñera] national administration".
>
> (Alejandro Soto, male, Community leader, July 2013, interview)

> "Mr Montes promised that the regional government, if not the national, would lift the ban on Chaitén".
>
> (Regina Muñoz, female, Community leader, August 2013, interview)

It is evident from these extracts that the visit of Montes to Chaitén perhaps indicated the clearest signal so far of the chance that Chaitén would be reconstructed. This did not necessarily mean that Chaitén was the best option, however, nor the safest, as early technical reports indicated the risk of reconstructing Chaitén (CIMM T&S Consultores, 2010; PUC et al., 2008a). But beyond judging the best solution for Chaitén's future, this new approach may have encouraged 'exiled' *Chaiteninos* to return to the city. Rojas (2013) estimated that between March and December 2010, the number of people living in Chaitén increased from about 500 to 1,500, but figures are hazy since there are no official records for that period. A national government official at MINVU who participated in the development of the New Chaitén master plan refers to Montes' new approach:

> "We perceived Montes' declarations as very bad [...] by giving them [*Chaiteninos*] hope, Montes stimulated people to remain in the devastated city, and maybe encouraged other *Chaiteninos* to return to the city despite the risks".
>
> (Benjamin Vergara, male, National expert and national government official, June 2013, interview)

It therefore seems that Montes' approach aimed to shift the central government's angle and thus alleviate tension between the Chaitén people and the national government. Ugarte and Salgado (2014) assert that this moment was characterised by a retraction of the national power and the dominant presence of the regional government, perhaps also a consequence of the 2010 Maule earthquake. This retraction is exemplified by the lack of coordination between the *Intendente* Montes and President Piñera. Montes announced the cancellation of the project in March but, in May 2010 during a presidential visit to Puerto Montt, Piñera amended Montes' statement by insisting that the New Chaitén would be built (El Mercurio, 2010). Several months later, Piñera contradicted himself and accepted the cancellation of the project. During that period, uncertainty returned to *Chaiteninos* until December 10, 2010, when *Intendente* Montes definitively discarded the New Chaitén and declared the North sector of Chaitén habitable again (Intendencia de la Región de Los Lagos, 2010). A community leader referred to this shift:

> "It was a tremendous struggle against the government's intention to relocate us definitively [...] we stayed firm and strong because Chaitén has always been our land, we did not want to live anywhere else".
>
> (María Jose Navarro, female, Community leader, July 2013, interview)

This view reflects the mood of many *Chaiteninos* living in Chaitén at the time. Although happy because of the recognition of a community decision that they had made long ago, the transition to a recovered community was far from being complete. As mentioned earlier, Chaitén is today a divided city, where more than 200 families lack access to basic services and are unevenly exposed to hazards, and the trust in authorities has eroded. The progression and configuration of this latest vulnerable scenario is understandable through analysis of the post-disaster processes discussed so far —evacuation, recovery, the aborted relocation— but only completed with the examination of the reconstruction of (half of) Chaitén.

## 5.4 Reconstruction

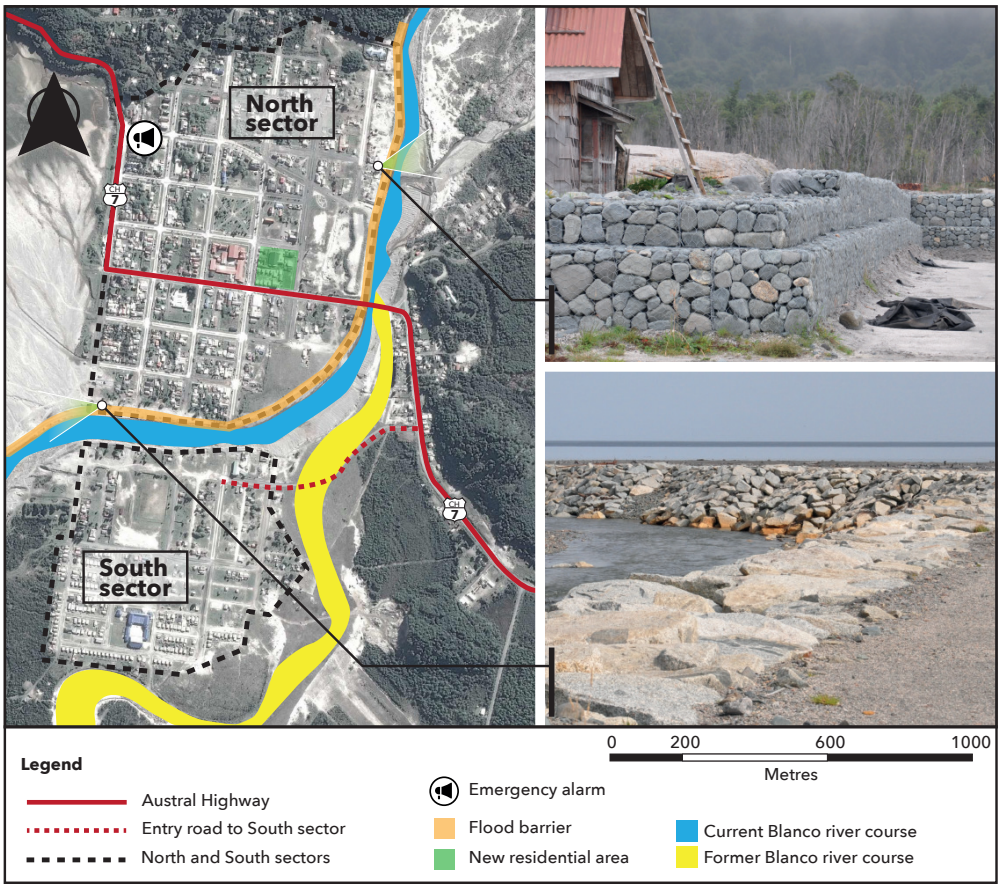
The ban on inhabiting the North sector of Chaitén was lifted on December 10, 2010. Beyond the reasons behind such a decision discussed already, it represented an important change in many aspects of *Chaiteninos'* lives and how they projected their future. This is also true for local authorities, especially the Municipality. The analysis of the reconstruction phase and its effects on the accumulation and materialisation of vulnerabilities in the city and its population spans December 2010 to the end of 2013. It considers the significant resources allocated to restore urban services, and a series of pre- and post-disaster demands that remain unmet —e.g. connectivity and the recovery of the 'community' (North and South sectors together).

Many aspects of the reconstruction of Chaitén have already been introduced or mentioned in this chapter as they served to better understand certain processes. For instance, section 5.1.1 mentions that the principal activity by number of workers registered between 2006 and 2013 was the construction sector, perhaps because of the need to reconstruct the city, and section 5.1.2 discussed how the public sector, since 2010, has become almost the only source of employment and income, accentuated by the fact that the state still owns the majority of the housing stock in the city, thanks to the Chaitén Law.

### 5.4.1 Occupying the South sector

According to several municipal and provincial officials interviewed in 2013, the significant resources allocated to reconstruction of the city included the restoration of basic services and infrastructure, and mitigatory measures to reduce exposure, such as the flood barrier for the North sector constructed during 2011 (see Figure 5.22).

**Figure 5.22. Mitigatory infrastructures in Chaitén**




*Source: elaborated by the author (2017); satellite image from Google Earth Pro (2016)*

These significant resources can be substantiated by recalling the distribution of the Chaitén municipal income between 2000 and 2015, which shows an explosive increase during 2011 as a consequence of national transactions (see Figure 5.9, page 193). These transactions rose to US$ 2.29 million, representing 55.05 per cent of the communal budget in 2011. A municipal council member and a community leader referred to the reconstruction:

> "We had to rebuild the municipal school, the hospital, remove all ashes from the streets, restore electricity, water, telecommunications [...] all this required workers, and many *Chaiteninos* were employed, but many outsiders came too [...] there were jobs and money, and not sufficient hands".
>
> (Guillermo Ugarte, male, Local government council member, March 2013, interview)

> "*Chaiteninos* started to come back throughout 2011, especially those who did not sell their houses through the Chaitén Law [...] some of them had to rent houses from the state [...] others just occupied their houses. That happened especially in the South [...] especially the outsider workers, they just saw empty houses [in the South sector] and occupied them. […] Many people were unable to pay rents and there were not many affordable houses".
>
> (Angela Rodriguez, female, Community leader, September 2010, interview)

From this interview, it is possible to observe an early and yet significant element of the reconstruction phase: the need for labour and for housing for both the returned population and outsider workers. For some municipal officials interviewed, and highlighted by community leaders, the scarcity and lack of affordability of housing opportunities in the North sector pushed people to occupy the South sector illegally. According to an official from the Ministry of Housing (MINVU) in Chaitén interviewed in September 2013, MINVU was aware of the need for housing. The same is true of the Mayor of Chaitén in 2013, Pedro Vásquez (Baeza, 2013). The same official also revealed that the government was planning housing projects in the future, but there was nothing concrete to talk about at that time. 'Nothing concrete' was also confirmed by some community leaders, who pointed out their feelings of uncertainty regarding the need for housing. Rojas (2013) also documented *Chaiteninos* complaining about the high cost of renting a property in the North sector –state owned houses– because most of the houses had deteriorated or were damaged due to the disaster in 2008 and abandonment. This confirms that the lack of housing projects and affordability may have been a factor that influenced the informal settlement of South Chaitén.

On January 17, 2017, under the second Bachelet administration, MINVU inaugurated the first new residential settlement in the North sector for about 60 people. Perhaps further investigations into Chaitén could look at the impact of this housing project in the city (see 'New residential area' in Figure 5.22).

**Figure 5.23. Demolition works in the South sector of Chaitén**


*Source: Cristian Albornoz (July 2013)*

As seen in Figure 5.23, in March 2013 the regional government initiated a demolition policy that sought to destroy abandoned houses and clear the area in the South sector. This policy may have influenced and accentuated the vulnerable situation in the city. An official from the regional government referred to this:

> "The South [sector] is risky. There is no flood barrier for this sector [...] and everything indicates that the South is not habitable [...] the idea [with the demolitions] is to reduce occupation and therefore people at risk [...] every year there are more and more people living there".
>
> (Ismael Henriquez, male, Regional government director, August 2013, interview)

This extract reflects the interest and urgency of the government in controlling the number of people settling in the South sector, seeking to avoid new occupation. It also clearly sought to reduce the risks of a future disaster by lessening the number of people exposed to sudden volcanic mudflows. Figure 5.10 (page 195) shows that the entire South sector is at high risk. This also reflects two related aspects of the settlement of the South sector: abandonment and timing. On the one hand, the sector was completely ignored by regional and national authorities, and on the other, this lack of attention, lasting about two years, from 2010 until 2013, progressively exacerbated the vulnerable situation in the area. It is interesting to see

that after North Chaitén became habitable in December 2010, there were no policies for the South sector that were beyond the simple prohibition of inhabitancy: no incentives to leave, or law enforcement and compliance. In 2014, according to the new Presidential Delegate for the reconstruction, Paula Forttes, "Chaitén has today a serious housing problem: there are not enough housing units for all, the biggest obstacle to the development of Chaitén" (El Mercurio, 2014). The lack of attention, planning and policies for the South sector for more than two years may have contributed to its repopulation. Therefore, the settlement of families in the sector highlighted the materialisation of an uneven distribution of risks, as northern and southern *Chaiteninos* are unevenly exposed to hazards. This uneven exposure can be understood as a vulnerable –or unsafe– condition that Chaitén's people face at the local level. Here, 'local' refers to the spatial proximity of Chaitén's people to the source of hazard –the Chaitén volcano is just ten kilometres away. We would assume that proximity to a volcanic hazard should suppose a homogeneous distribution of risk, but it does not. The North sector has flood protections that mitigate its exposure to potential 'volcanic mudflows' that may be produced in future eruptions, while the South sector lacks such provision (see Figure 5.22, page 230). However, to experience an uneven distribution of risk, *Chaiteninos* must not only have uneven exposure to hazards, but also unequal coping capacities and vulnerabilities. The latter is something that will be addressed in section 5.4.4.

### 5.4.2 Chaitén (North) reconstruction plan?

In 2011, the Municipality's budget for recovery projects increased by 257.8 per cent in relation to the previous year, from US$ 0.64 to 2.29 million (Municipalidad de Chaitén, 2011a). This indicated a significant state effort aimed at recovering Chaitén. 'Chaitén solution', the 'Chaitén solution plan' (Cooperativa, 2011) or the 'North Chaitén solution' (Presidencia de la República de Chile, 2011) are some of the names that official documents and authorities have used to refer to all the projects and initiatives aimed at mitigating risk, reducing exposure and rehabilitating services in Chaitén (GORE Los Lagos, 2011). Some of these initiatives included the

rehabilitation of public buildings, the restoration of public transport and street lighting, and educational and health services, among others. During the fieldwork, however, when I asked local, regional and national officials to review such a plan, there was no document to refer to; nor was I able to find one in the institutional archives. In some cases, I received copies of the Municipal Accountability Reports, in others, budgeting documents. The lack of a document that encapsulated the supposed plan for the reconstruction of Chaitén beyond the simple restoration of services and mitigation of risks can be seen as an indicator of the urgency of the government to transition quickly from the relocation of the city to a reconstruction approach. The narrative of a 'reconstruction plan' was regularly used by authorities simply to indicate that attention was being paid to Chaitén and that a significant amount of resources were being allocated to rehabilitate services and rebuild the destroyed infrastructure. However, these resources and projects were not bounded within a comprehensive plan, within a long-term planning process. Indeed, it is the lack of a plan which may have influenced the repopulation of the South sector and later developed an uneven distribution of exposure. The supposed 'plan' restricted all investments –including risk reduction projects– to one group of the population and almost entirely neglected the other in the South.

### 5.4.3 Unmet demands

Poor connectivity between Chaitén and the rest of the region is one of the historic local demands that persisted during the reconstruction. Based on reports from the CASEN survey (MIDEPLAN, 2003, 2006) and the experiences shared by interviewees, poor connectivity has historically produced unequal mobility and opportunities between Chaitén and Los Lagos Region, and the country. The literature on the relationship between remote settlements and development (Taylor and Susilawati, 2012) refers to the importance of connectivity not only as a crucial element for social and economic development, but also as a human security issue in cases of evacuation (Pelling and Uitto, 2001). Remember that during the emergency in May 2008, the evacuation was possible thanks to private ships that answered the call. I personally experienced the connectivity issue, as it took me around 12 to 14

hours to reach Chaitén from Puerto Montt, an approximate distance of 200 kilometres. The director of the Health Station in Chaitén told me in March 2013 that in case of health emergencies such as complications in childbirth, they depend on a regional private company which offers air assistance to transport patients to Puerto Montt's hospital. This means that connectivity has been, and continues to be, an important element in the development and safety of Chaitén, and perhaps it can be considered an unsafe condition, although its root causes are not directly linked to policy responses.

For instance, although the bi-mode route[36] was entirely re-established in 2012, local authorities from the Palena province and Los Lagos Region assert that the route is just an alternative, not a real solution to the connectivity issue. A bi-mode route indicates that there is no direct land connection between Chaitén and Puerto Montt, the regional capital. Table 5.3 shows that in 2010 the regional government projected to invest about US$ 212 million for reconstructing and rehabilitating the existing transport and communication infrastructure.

**Table 5.3. State budget to invest in Chaitén's connectivity 2011-2014**

| Areas | Include | US$ million |
|---|---|---|
| Emergency connectivity | Basic road to Chaitén, Caleta Gonzalo, mechanical bridge, cleaning of Chaitén's port and recourse of the river | 5.566 |
| Connectivity | Fandango port, Chaitén local airport, paving of Route 7, the bi-mode section between Puerto Montt to La Junta (Aysén Region) | 22.909<br>25.455<br>157.729 |
| | **Total amount** | **212.345** |

*Compiled by the author (2017), based on Montes and Allendes (2010)*

However, only a few of these projected investments could be traced or found within official documents such as budgeting and accountability reports (GORE Los Lagos, 2011; Municipalidad de Chaitén, 2011a). This suggests that the issue of connectivity will remain an important problem and likely will be an increasing demand. A municipal council member referred to this demand and the relationship with regional and national authorities:

[36] A bi-mode route combines two modes of transport in one route, by land and sea.

> "It has always been like this [poor connectivity], before 2008 [...] we were alone here [...] we have tried to cope with the connectivity problem by investing here and there, subsiding transport costs, etc. but there is not much that we can do".
>
> (Federico Rivas, male, Local government council member, July 2013, interview)

This excerpt indicates that despite the investments and the supposed 'reconstruction plan', connectivity issue has not been incorporated within a holistic view of disaster risk reduction. Community leaders and authorities often complained about remoteness and the little attention paid by regional and national authorities, illustrating the persistent tensions between the national and local levels, perhaps accentuated by the reconstruction. During the field observations, it was also possible to note that some projected investments, such as the local airport and the seaport, had yet to commence. Figure 5.24 shows that the seaport (left) and the local airport (right) utilised the same infrastructure prior to the volcanic eruption in 2008.

**Figure 5.24. Seaport (left) and local airport (right), Chaitén**


*Source: Leonardo García (July 2013)*

Besides connectivity, another unmet demand relates to the national government policy on considering North Chaitén as the one and only Chaitén, neglecting the existence of the other Chaitén in the south. This particularly relates to the demand

for a bridge that would connect the North and South sectors, as well as flooding protection for the south bank of the riverbed. A community leader in the North sector referred to their southern neighbours:

> "People in the South sector are our friends and families; most of them lived there before the eruption [...] they have the right to live there [...] we are only one community, Chaitén is only one".
>
> (Angela Rodriguez, female, Community leader, September 2013, interview)

A member of the Municipality Council also referred to the reality of the South sector:

> "People in the South sector are in need; they lack most of the basic services just because they [authorities in Santiago] do not want to face the reality [...] So, we help them as we can, by providing a bus that takes children to the school in the North sector".
>
> (Federico Rivas, male, Local government council member, July 2013, interview)

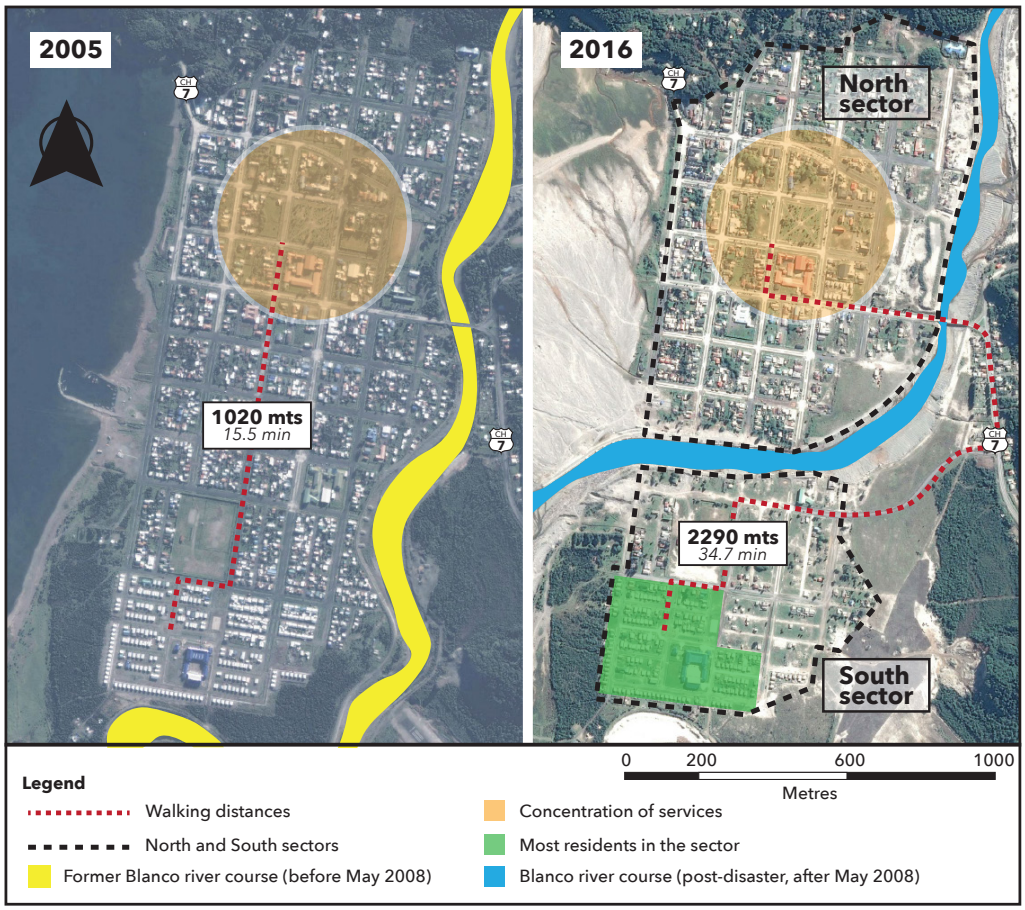
The first interviewee reflects the feelings of many other community leaders and local authorities about the reality in the South sector and the sense of community they have. The second interviewee indicates that people in the South are part of Chaitén, and that the local government plays a role in mediating their participation in the urban life of North Chaitén. In my view, it seems difficult for northern *Chaiteninos* to plan the future of Chaitén without considering the South sector, as they shared the same city before the eruption and, despite the new river course, they are right there in front of them.

### 5.4.4 Limited access to services

At the beginning of this chapter (page 194), I introduced the idea of the limited access to services experienced by southern dwellers as an unsafe condition which relates to the difficulties in accessing basic public services such as health, water, sanitation, transportation and education, among others. This unsafe condition materialises at the local level and creates an uneven distribution of risks if we look at the North and South sectors as one city.

Figures 5.25 and 5.26 show that *Chaiteninos* in the South must walk long distances to access these services. Distances in Figure 5.25 were calculated using the Google Earth Pro measuring tool, considering the principal street corners in the North and South sectors according to the interviewees. Walking time was calculated using the preferred walking speed in Chile: 1.1 mts/sec. (MINVU, 2009).

**Figure 5.25. Walking distances between two spots in Chaitén in 2005 and 2016**




*Source: elaborated by the author (2017); satellite images from IGM (2012) and Google Earth Pro (2016)*

**Figure 5.26. Chaitén resident walking to the South sector**

*Source: Author (March 2013)*

Figure 5.26 shows the difficulties that people face every day to reach the North sector. The long distances are especially difficult for the elderly and children in winter. To access urban services, they must walk double the distance –from 1,020 to 2,290 metres– and spend double the time –from 15.5 to 34.7 minutes– they used to prior to the eruption in 2008. This spatial inequality (Atienza and Aroca, 2012) may also entail unequal access to income opportunities and jobs, and safety. Furthermore, while the North has received national support to clean up its streets from debris and ashes and to restore basic services, people in the South still live in a kind of "post-war environment" (Gabriela Miranda, female, National consultant, July 2013, interview). Figure 2.24 displays this everyday environment in the South, surrounded by demolished buildings and accumulated debris. The difference in urban living conditions in terms of access to services and opportunities, lack of infrastructure –especially to mitigate risks– and poor features of the urban built environment, illustrates the uneven distribution of vulnerabilities and risks.

**Figure 5.27. Demolished housing units in the South sector of Chaitén**

*Source: Author (July 2013)*

During several visits to the South sector, I observed how residents have invested in repairing their houses while no public services have been restored. Figure 5.28 shows *El Rinconcito*, the only grocery store in the sector. In the picture, it is possible to appreciate the water storage tanks standing high on the roof of the store (black tank) and on the house on the right (blue tank). This illustrates how they deal with the lack of water supply. In July 2014, I was informed by another researcher in the area, Cristian Albornoz, that the neighbourhood association *Junta de Vecinos Chaitén Sur* had signed an agreement with the Municipality to provide them with water through a cistern truck or tanker, which visits the sector twice a week.

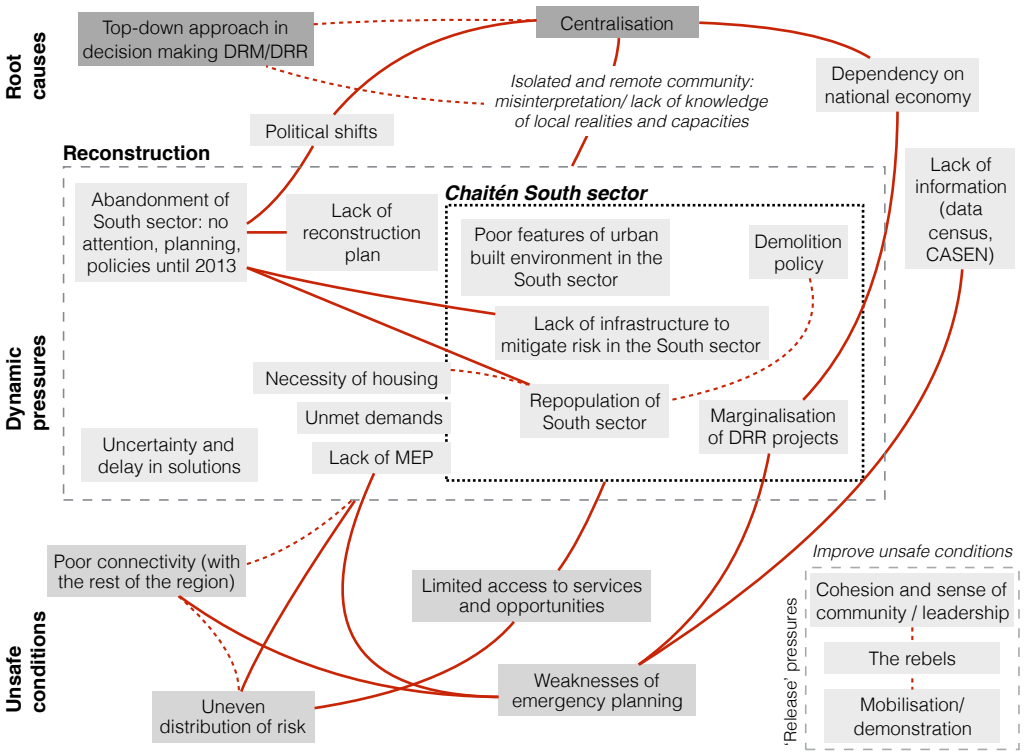
**Figure 5.28. Neighbourhood grocery store in the South sector of Chaitén**

*Source: Google StreetView (March 2014)*

Likewise, a consultant who interviewed families in the South sector in 2012 told me that people have organised themselves to get water and electricity from December 2010 until the end of 2012, sharing the cost, which is around US$ 60 monthly per family (Gabriela Miranda, female, National consultant, July 2013, interview). Later, in 2013, South sector dwellers obtained from the Municipality a new diesel electricity generator and a bus service that helped children attend the school in the North sector, the only school in Chaitén. That was achieved through a neighbourhood organisation, *Junta de Vecinos Chaitén Sur*. These actions tell us a bit about people's agency to organise themselves and their capacity to cope with the lack of services. Such capacities are also manifested through the various demonstrations and organisations, such as 'the rebels', that have been initiated since the very moment of the emergency (see Figure 5.15, section 5.3.2). Likewise, having improved access to water and electricity indicates the progress in the sector, and the support and recognition obtained so far. It is perhaps an indication that vulnerabilities and risks could be reduced in the future if they continue to negotiate with the local authorities. Nevertheless, the decision to lift the ban in the sector remains with the central government in Santiago.

Beyond the demolition policy described in section 5.4.1, and the better access to water and electricity, it is possible to estimate that there is little attention paid to the people and their conditions. There remains a persistent abandonment of this sector and its people. In Figure 5.29, I summarise the elements of the reconstruction discussed so far, and connect them in terms of the progression of vulnerability and risks in Chaitén.

**Figure 5.29. Progression diagram of vulnerability during the reconstruction in Chaitén**




*Source: elaborated by the author (2017)*

As observed in this diagram, an uneven distribution of risks materialises when considering the differentiated access to services and opportunities between the North and South sectors and their levels of exposure, mitigated by infrastructure in the case of North Chaitén. However, the root causes and dynamic pressures that facilitated the realisation of such vulnerable conditions can be traced back to decision-making and policies aiming, somewhat ironically, to recover the population. Indeed, it was the lack of a reconstruction plan and the subsequent abandonment of the South sector that may have pressured to people to settle in the

South. The political shift from Bachelet to Piñera's approach was of fundamental importance for the future of *Chaiteninos*, but it also demonstrated the vertical ordering and centralised power of the state. Certainly, this centralisation and top-down approach manifested during the reconstruction, as it did in the other post-disaster phases, in form of Chaitén's dependency on the national economy and the marginalisation of DRR projects (see section 5.1.2), and of unmet demands such as in relation to connectivity and integration between the North and South sectors.

Another unsafe condition detected during the analysis of the reconstruction was the weaknesses in emergency planning, based mainly on the lack of an updated Municipal Emergency Plan (MEP). MEPs are crucial for the coordination of emergency actions at local levels such as during evacuation, but also to enable preparedness and DRR actions. Communal Civil Protection Committees (Communal CPCs)[37] in each of the country's municipality are responsible for elaborating MEPs and updating such plans every year. MEPs are supposedly designed collaboratively and yearly by different communal actors such as police, fire and health services, and private and civil society organisations. During the fieldwork in 2013, the latest MEP had been issued in 2010. The lack of an updated MEP can put people directly at risk by not considering actions to assess vulnerabilities, exposure, risks and, eventually, the necessary actions to reduce them. In other words, it means that the main local leaders such as the Mayor, the police, community-based organisations and so forth have not met to check their procedures for coordinated action in the event of an emergency. This may have the subsequent effect that such organisations have not held meetings to review the provisional resources they have and will need in order to ensure the effectiveness of future emergency operations, nor to detect limitations and opportunities in relation to DRR, and other important measures. The weakness in emergency planning is accentuated by the historical problem of connectivity/accessibility of the city with the rest of the region and the country, and the lack of information, something crucial for good decision-making (see section 5.1.1). The lack of an updated MEP –at least until the composition of this thesis– may also suggest a problem with the prioritisation of DRR projects and actions.

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[37] The National Plan of Civil Protection and the role of CPCs are discussed in section 4.4.1, page 156, Chapter Four.

Regarding Chaitén and its multi-scalar progression of vulnerability, it is possible that although there was a significant presence of the state during the emergency and the post-disaster phase –characterised by its policy response of recovery strategy, relocation, reconstruction– there are other aspects of policy response which operate in the opposite direction to disaster risk reduction, like those reviewed above. The lack of planning, the little space for participation and the top-down approach of DRM are some examples. It seems that during the post-disaster phase two opposite forces coexisted, acting at the same time: on the one hand were all the processes aiming to respond to the emergency and recovery, while on the other there were underlying processes that diminished the potential of such response actions and ultimately became sources of future vulnerabilities and risks.

However, there were also counteracting elements inherent in people and the community that were able to focus the pressure over unsafe conditions: the community group deemed 'the rebels' is a good example of self-organisation and determination which has not stopped fighting for attention from regional and national authorities, as is the fact that people in the South sector are now organising themselves to cope with the lack of basic services and to fight for attention, too. This can be seen as an indication of the capacities of people and of communities that should be considered when improving unsafe conditions in the sector. This study has not focused on the 'release' aspects of vulnerability and risk production, rather, it aimed to explore the pressure processes within the model of DRM and DRR and the institutional and policy responses, with the intention of re-problematising the production of vulnerability and risks from that angle. Nevertheless, I think it is analytically precise to recognise that communities and people are not mere recipients of support who are passively affected by policy responses to disasters. For these reasons, I think further investigations of Chaitén and other similar cases should look at incorporating a more comprehensive characterisation of the capacities and abilities of people and communities.

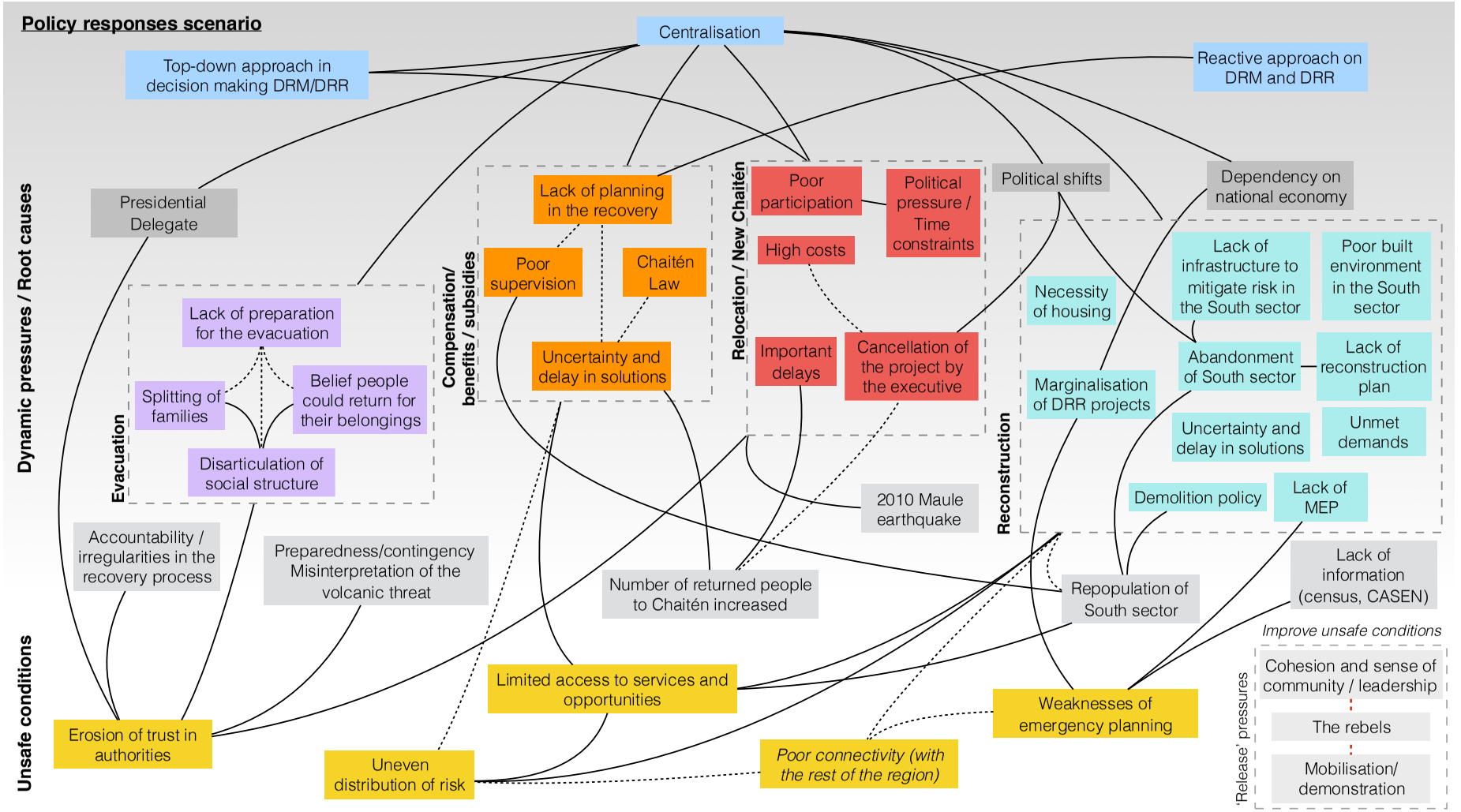
## 5.5 Mapping the progression of vulnerability

So far, I have analysed policy responses from authorities, governments and institutions at different level –local, regional and national– relating them to the context of Chile, but specifically to the model of disaster risk management and reduction. I have tried to connect such responses with the potential underlying causes of unsafe conditions and vulnerability, with the intention of understanding why policy responses to the Chaitén disaster have not effectively reduced vulnerability. In the process, I observed four relevant unsafe conditions:

- Erosion of trust in authorities
- Uneven distribution of risks
- Limited access to services and opportunities
- Weaknesses in emergency planning

These vulnerable conditions are specific to Chaitén city and place-dependent. However, the dynamic pressures that facilitated their materialisation may have been influenced by the verticality of the model of DRM and DRR, as well as by the centralisation of decision-making. For instance, a process that initially contributed to the erosion of trust in authorities was the evacuation. The unplanned destinations, the fact that families were separated and the false indication that they could return days later for their animals, pets, belongings and other valuables were just some of the reasons given by interviewees arguing that they would not follow authorities' indications in future emergencies. As we reviewed in section 5.2.2, the evacuation was applied by the national government using a top-down approach that did not consider people's capacities, needs and local realities, revealing how pressures that give rise to unsafe conditions can be distant and nested at major scales. The same logic is repeated with other elements of policy response, such as the compensatory measures –subsidies and benefits–, the relocation project and the reconstruction. Figure 5.30 tries to capture a more complete picture of the progression of vulnerability for the case of Chaitén, considering the elements discussed in Chapter Four and Chapter Five. This figure puts together all progression diagrams introduced throughout this chapter (Figures 5.13, 5.17, 5.21 and 5.29), which were in fact partial sections of the full case.

**Figure 5.30. Progression diagram of vulnerability for the case of post-disaster Chaitén**




*Elaborated by the author (2017)*

Every element of this progression diagram has been explained and discussed individually in different sections in this chapter, so after introducing the diagram I will concentrate on analysing and connecting the main processes of the case study. The first thing that stands out from the figure is the gradient area. This attempts to represent the scenario in which root causes and dynamic pressures are embedded and which facilitates the production and progression of vulnerable conditions. This scenario contains the four principal processes of policy response analysed: evacuation; compensation, benefits and subsidies; relocation and New Chaitén; and reconstruction.[38] The gradient is used here to visualise a continuum rather than an exact line that separates root causes from dynamic pressures, and for that reason these processes should not be seen merely through the lens of cause and effect. As described in the PAR model, root causes and dynamic pressures "are not independent of each other, they are intricately connected in a series of mutually influencing relationships that obscure causes and consequences" (Wisner et al., 2004, p.62), and although the perspective adopted in the study aligns with the cause-effect approach, in this study I refer to cause and effect in the sense of cascades, as cumulative and non-linear sequential processes that may trigger complex effects such as vulnerability (Wisner et al., 2004). Processes such as centralisation or the top-down approach of DRM, highlighted in blue coloured boxes, are proposed as influential elements rather than single causes of single effects.

Figure 5.30 also illustrates a relevant number of processes and events at the root causes/dynamic pressures level. Among them, the reconstruction phase stands out because of the number of links –six in total– with several unsafe conditions. This could be explained by reconstruction being the latest phase in the progression analysis, and therefore closer to the materialisation of unsafe conditions. Centralisation also attracts attention because of its connections –eight in total– with the four main processes of policy response analysed. This could be related to the

[38] Analysis of each of these processes is found in this order: early response on page 193 (summarised in Figure 5.13); compensation strategy on page 212 (summarised in Figure 5.17); relocation and New Chaitén project on page 217 (summarised in Figure 5.21); and reconstruction on page 229 (summarised in Figure 5.29).

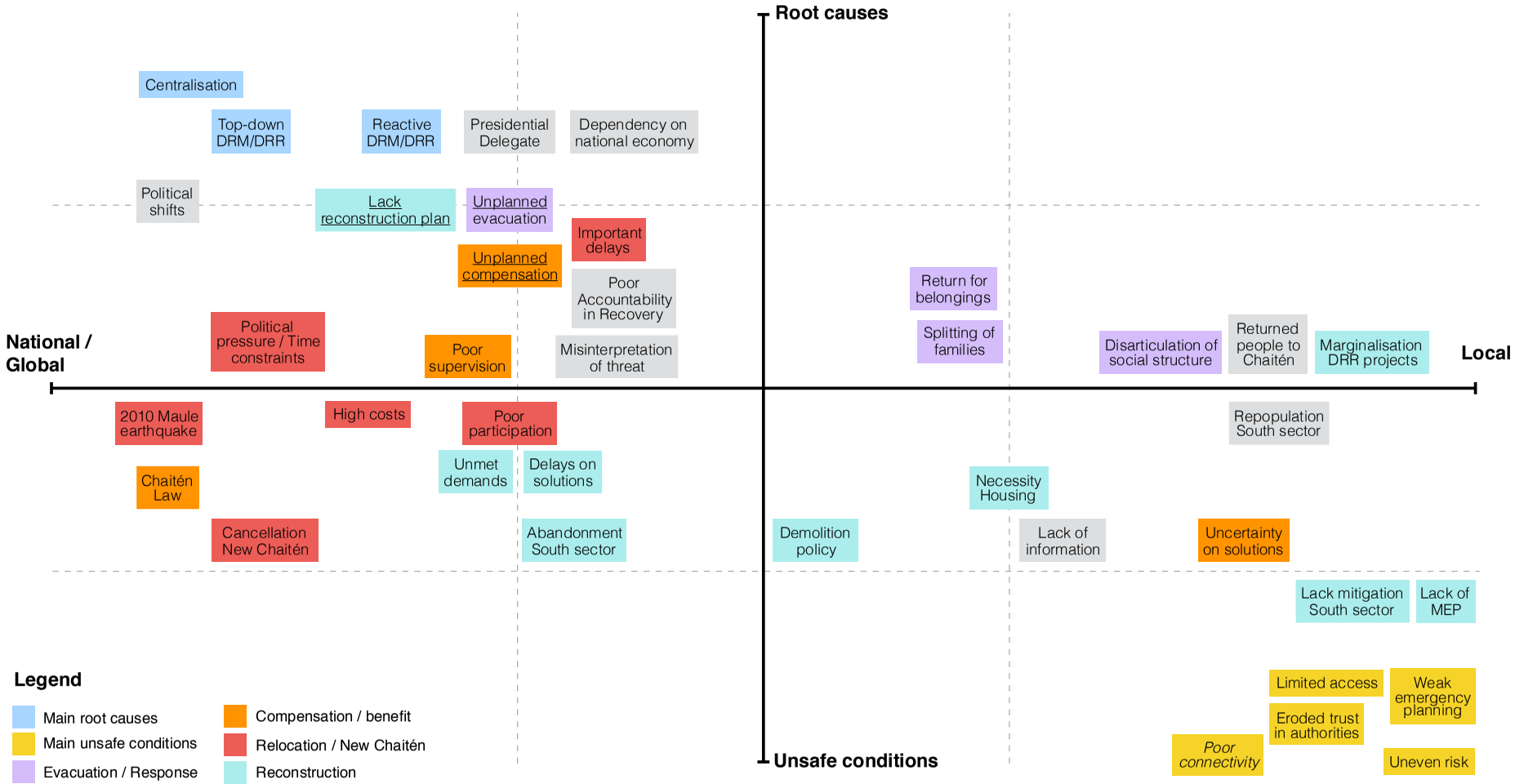
fundamental role of decision-making of DRM in Chile, characterised by its centralisation at the national level. Nevertheless, analysis of the progression of vulnerability would benefit from a multi-scalar visualisation that better distributes the analysed elements, in terms of the geographical scale at which they were generated and their historical moments.

For that reason, a multi-scalar visualisation could offer an advantageous perspective for looking at dynamic pressures and root causes in relation to structural factors of society and institutions, increasing the chances of scaling up observations and positing conclusions, although still within the inherent limitations of the study. By scaling up, I meant looking at how the progression of vulnerability takes place beyond the materiality of Chaitén, and how general processes of DRM and DRR could reproduce vulnerabilities in the future in other cases in Chile. To address the question of enabling a multi-scalar perspective for the progression of vulnerability, I have the elements discussed so far are plotted on a Cartesian coordinate system (see Figure 5.31) that considers different geographical scales (X-axis) and the progression of vulnerability (Y-axis). To place each element, I asked two simple questions in this order:

- At which level is the process or event originated or nested? —global, national, regional or local.
- If it is not possible to know its origin, which scale is this element or event affecting?

Figure 5.31 plots a significant proportion (nearly two-thirds) of processes and events that are situated above the first horizontal dotted line. This line separates the area of dynamic pressures (rectangle at the centre) from the unsafe conditions at the bottom. This reflects an underlying and intricate web of causes and drivers that participate in the production and progression of vulnerability, a complexity that is somehow tamed thanks to the PAR model and the adoption of a multi-scalar perspective. Another observation is that certain processes of policy response are more or less dispersed on the scale dimension (X-axis). For instance, the elements of relocation/New Chaitén (in red colour) are mainly concentrated in the area of the national scale, reflecting that the process of relocation may have been influenced principally by national processes and decision-making.

**Figure 5.31. Tentative scatter diagram for policy responses in post-disaster Chaitén, considering 'progression of vulnerability' and 'geographical scales'**




*Elaborated by the author (2017)*

In contrast, the elements of the reconstruction are more dispersed along the X-axis, indicating that more actors and processes interacted in the reconstruction than in the relocation process. This may be so because, firstly, during the relocation in 2009, *Chaiteninos* were dispersed and not very active –except the rebels– and, secondly, the reconstruction encountered a local government back in place, people and community structures already existing in the city, and a national government in retreat or less present than in previous years as a consequence of the presidential shift and the Maule earthquake in 2010.

Despite its potential, however, this diagram needs to be complemented by the previous progression diagram (Figure 5.30) to better understand why these policy responses have not reduced people's vulnerability. Figure 5.31 does not completely show the relationships between the elements –for instance, how the relocation project (in red) influenced the return of people to Chaitén and the erosion of trust in authorities. In that respect, I would like to point out that the lack of planning during the post-disaster phase was an important driver of vulnerability in the current Chaitén. In the diagram above, it is possible to observe that evacuation, compensation/benefit and reconstruction all contain the lack of planning element 'lack of planning' –underlined text– as a fundamental and root cause: for instance, the lack of a reconstruction plan provoked the abandonment of the South sector by the authorities and then its repopulation (see section 5.4.2, page 233). In contrast, the New Chaitén project did not have problems with planning, in the sense that the government worked on a master plan for the new city, dedicating time and resources to studying and planning solutions. However, it faced critical problems in coping with political and economic pressures, and time constraints that created important delays. So, being costly, without political and popular support, and delayed, the relocation was definitively aborted by the national government in December 2010 (see sections 5.3.4. and 5.3.5, pages 217 and 226 respectively).

Finally, a last observation on Figure 5.31 is directed to the gap that exists on the intermediate or regional scale, that is, the empty space between national and local scales. This gap may have been produced because most of the policy responses were nested within and articulated from the national power: the national government had the power to decide and articulate most of the policy responses, showing its gravitational role within the model of DRM and DRR. Likewise, this gap

reflects the centralisation of decision-making in the case of Chile, exposing the power of the national over regional and local powers (see more details in sections 4.2.3 and 4.3 in Chapter Four).

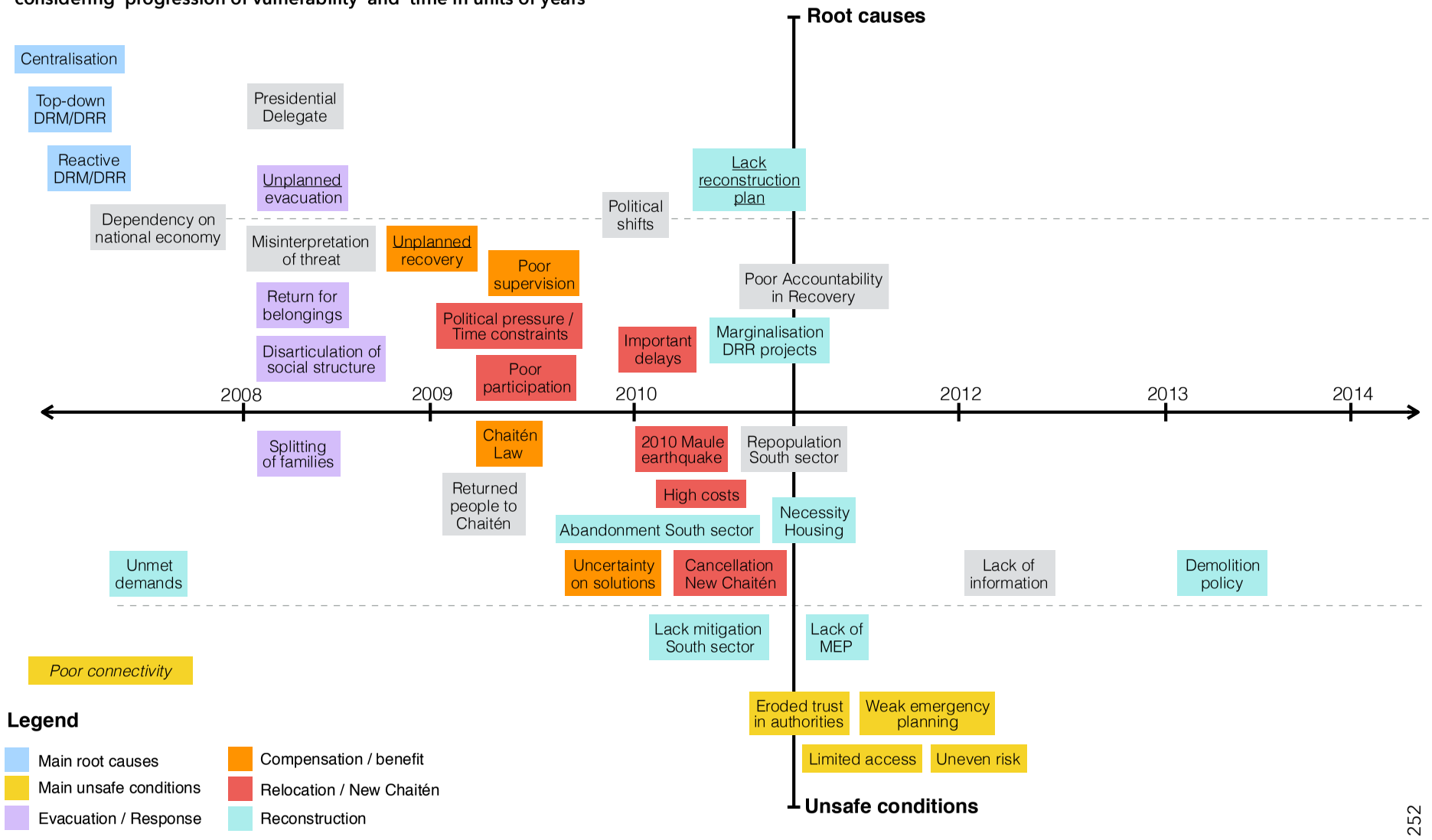
Concluding this chapter, I would like to offer a complementary third diagram centred on the temporal scale. The conceptual diagram in Figure 5.32 uses the same progression of vulnerability dimension (Y-axis) as Figure 5.31, but it replaces geographical scales with a temporal dimension (X-axis). The exercise is exploratory and seeks to analyse how distant the causes and drivers are from the unsafe conditions. By exploratory, I mean that this exercise cannot be completely exhaustive because the data collection instruments and methods were designed to look at the geographical scale dimension rather the temporal.

To initiate the exercise, I selected only the elements that could be expressed in time, asking two simple questions:

- At what time/date was this event or process initiated?
- If it is not possible to estimate an initial date, at what time was this event or process realised or materialised?

At first sight, the diagram shows a more distinctive pattern of distribution of the analysed elements, suggesting a more linear relationship between time and the progression of vulnerability. Wisner et al. (2004, p.52) assert that the root causes are always "distant in a spatial and temporal sense", so the pattern found in Figure 5.32 is congruent with such a proposition. If we look at the details, we can find some differences from the geographical dimension in Figure 5.31. For instance, processes of policy response such as the evacuation are less dispersed: the elements are concentrated at the beginning of 2008 (May) because the evacuation occurred in a relatively short period of time. This is also the case for the relocation/New Chaitén (in red). This may indicate that policy responses in the case of Chaitén have tended to occur concatenated over time, which is plausible if we consider the cyclical, but sequential, process of disaster management (see Figure 3.3 in Chapter Three). Nevertheless, other processes remain dispersed over time, such as the reconstruction. This may be because the reconstruction covered a larger period of time –from 2010 onwards. This may imply that, over time, longer processes of policy response may present more dispersed dynamic pressures and root causes.

**Figure 5.32. Tentative scatter diagram for policy responses in post-disaster Chaitén, considering 'progression of vulnerability' and 'time in units of years'**




*Elaborated by the author (2017)*

Finally, it is true that the temporal dimension of the progression of vulnerability was not directly included in the methodological design, nevertheless, time is a constant within such progression (Wisner et al., 2004). Therefore, during the study, I collected the dates of the different policy responses, decision-making, events and actions almost unintentionally. The data collected refer to the year or month in which a policy was conceived, the date on which a decision was made, and the like. I think that incorporating a historical perspective to analyse the progression of vulnerability from the beginning would perhaps have facilitated a deeper look at more distant events and processes than those examined here. This could, of course, be a matter for future investigations.

The next chapter is the last of this thesis, in which I will try to offer a comprehensive reflection on the process of research. Centred on the analysis made during the last two chapters, I seek to address how the thesis responds to the research questions and how it contributes to knowledge in epistemological, methodological and empirical terms.

# Chapter Six
# Conclusions

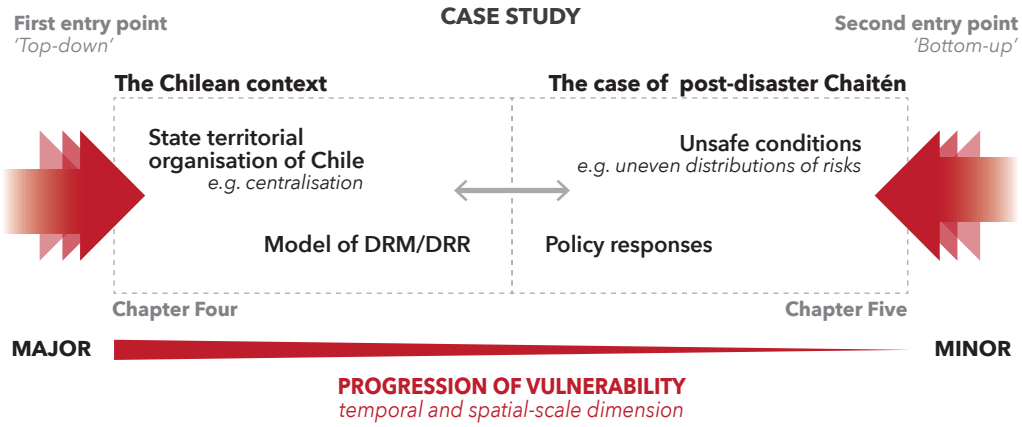
## Introduction

In the previous chapters, we explored and analysed specific links between temporally and spatially distant processes –e.g. policy responses, governance and decision-making, institutions– and the local 'materialisation' of vulnerability in the form of 'unsafe conditions' in Chaitén. As formulated in Chapter One, the main research question reads: **How have policy responses to disasters influenced the progression of disaster vulnerability, at different scales, in post-disaster Chaitén?** Each chapter unpacked the different components of the enquiry to provide the empirical grounds for answering the question. This study found that policy responses and other vulnerability causal factors were distanced from Chaitén itself –as the theory of vulnerability suggested– and organised according to their scalar nature: national, regional, and local.

The main question had two subsidiary dimensions that aimed to focus on specific elements of vulnerability creation. The first centred on critically determining that vulnerabilities in Chaitén are locally materialised in form of, for instance, uneven distributions of risks. The second looked at how these unsafe conditions were not exclusively locally produced –as distant, extra-local processes of policy response and decision-making may have contributed to the materialisation these vulnerabilities. These two dimensions are two sides of the same coin, and were expressed on the research design as 'entry points' (see Figure 6.1).[39] The figure below develops these two dimensions investigated in the case study. One could be called 'inductive' or 'bottom-up', because it tried to reflect the progression from the specificity and locality of Chaitén, to processes of policy response and decision-making. In contrast, the second could be called 'top-down' entry point, as it attempted to trace, document, and reflect these processes of policy response from more general social processes such as the Chilean state territorial organisation and its model of DRM.

[39] See alternatively the 'research process' in Figure 2.5, page 53.

**Figure 6.1. Case study entry points**




Although case-based, the research questions also sought to expand and contribute to the epistemological debate on disaster vulnerability, conceiving it as a 'process' where "multiple pressures and factors that combine to create and increase vulnerability" (Twigg, 2015, p.329). It is in this process and 'progression', as a terminology that embraces dynamism and incrementality as well as suits to scale, that the thesis is built on. The causes and drivers of vulnerability in Chaitén pointed out policy responses and decisions made by the central government after the disaster in 2008. This aims to re-problematise the progression of vulnerability and risks in a post-disaster context, and seeks to challenge some still dominant views instilled in many national governments that "hide or dissimulate the causality of risk [and disaster] generation and accumulation" (UNISDR, 2015a, p.262). The thesis, besides offering of a specific case study grounded in a specific institutional geography, sought to re-problematise and develop new ways of 'thinking vulnerability' and risks from a multi-scalar and wider perspective. That may help to tackle the lack of understanding and uncertainty among policy makers and decision takers who tend to address immediate dynamic pressures and unsafe conditions, while "neglecting both the social causes of vulnerability as well as the more distant root causes" (Wisner et al., 2004, p.61).

This chapter aims to provide a series of conclusive remarks. It is divided into four sections. The first answers the research questions and introduces some

epistemological implications illustrating how policy responses to disasters may, counterintuitively, contribute to (re)produce risks. This part also answers the question showing how vulnerability is locally 'materialised', and how the state territorial organisation of Chile and its model of managing and governing disasters are connected. The second section introduces some methodological and empirical implications that re-problematise the progression of vulnerability and risks and advances policy responses to disasters. The third section offers some final remarks and reflections on the research journey, while the fourth section presents suggestions for further research.

## 6.1 Research questions and epistemological implications

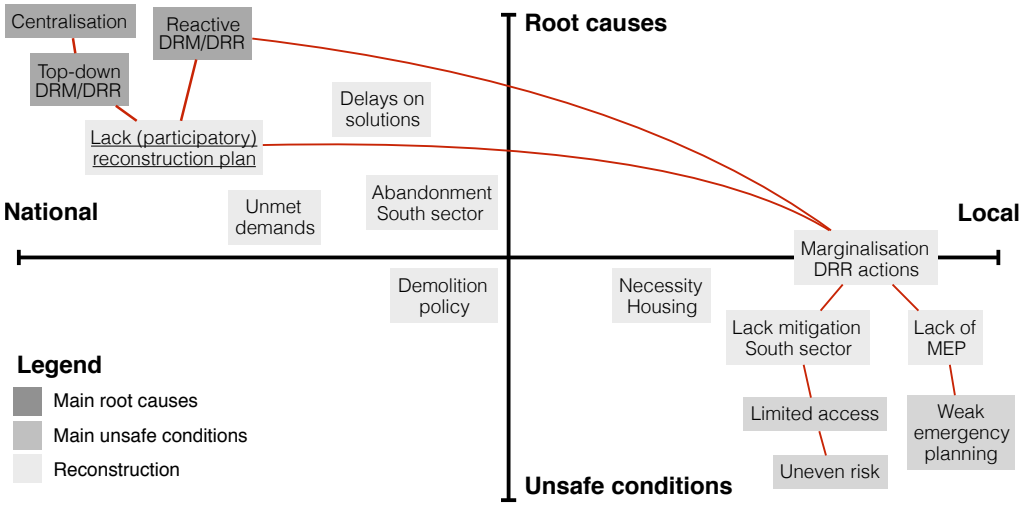
### 6.1.1 Vulnerability locally materialised

Dominant views of 'disaster risk' still recall the dilemma of 'taking the naturalness out of natural disasters' (O'Keefe et al., 1976), restricted views that see disasters 'natural', "as if nature were the executioner and not the victim" (Galeano, 2012, p. 113). This ontology determines that models of management are still dominated by the paradigm of 'disaster risk', where efforts and resources are concentrated in emergency management and preparedness, as well as in corrective or compensatory risk management, rather than in prospective governance of risks, with sensitive risk development in social, economic, and environmental terms (Lavell and Maskrey, 2013). Restricted views that still persist in many countries and national models of disaster management (UNISDR, 2015a): "this is the space into which most nations have yet to tread" (Lavell and Maskrey, 2013, p.7). Chapter Two posed the question: **How and why did the Chilean model of DRM facilitate the production and progression of specific vulnerabilities in post-disaster Chaitén?** with the intention to explore and bring to light the underlying causes and relations that take place at multiple scales to, ultimately, see what makes *possible vulnerability* become *actual vulnerability*. To disentangle the multiple causes and drivers that create and reproduce vulnerability, the disaster Pressure and Release (PAR) model is a useful

analytical tool, allowing us to distinguish and categorise diverse elements into 'root causes', 'dynamic pressures', and 'unsafe conditions'.

In Chapter Five, the current vulnerabilities detected in Chaitén are expressed in the form of local-specific unsafe conditions and specifically: a) the erosion of trust in authorities, b) the uneven distribution of risks, c) the limited access to services, and d) the weaknesses in emergency planning. These conditions were materialised through several stages, both spatially and temporally, by policy responses and decision-making actions[40]. For instance, the figure below develops the progression of the unsafe condition in Chaitén that we defined as 'weak emergency planning'. This links basically to the lack of a Municipal Emergency Plan (MEP), which puts people at risk because there is no preparedness. Some of the reasons behind this lack of preparation relates to the centralisation of disaster governance, which is mainly reactive and top-down oriented, producing inadequate reconstruction planning and poor participatory mechanisms.

**Figure 6.2. Vulnerability progression diagram, Chaitén reconstruction phase**




As we reviewed in section 4.2 (page 134), the scalar logic of policy responses and decision-making resides in the way in which the national model of disaster

[40] See other examples in Chapter Five –Figures 5.13, 5.17, 5.21, 5.29, and 5.30.

management operates and its organisational structure, which has tended to reproduce the hierarchical structure of the state. Centralised, top-down approached, and reactive, the practice of managing disasters set the 'ground rules' that allowed national authorities 'dictate' policies and decisions without taking into consideration local aspirations, demands, and needs. This creates the conditions for national actors such as the Presidential Delegate to ignore and underestimate people's demands and aspirations while it justifies a top-down response to disasters and recovery. The Presidential Delegate, for instance, eroded the trust of *Chaiteninos* on public authorities and institutions, and this may negatively affect future evacuations and the effectiveness of DRR strategies in the long run.

In Chaitén, the 'uneven distribution of risk' to volcanic hazards can be understood as a vulnerable condition that *Chaiteninos* face at the local level. Here, 'local' refers to the spatial proximity of women and men to the source of hazard –the Chaitén volcano at just 10 Kilometres from the city. Such proximity to a volcanic hazard should suppose a homogeneous distribution of risk, but it does not. Chapter Five expounded upon the observation that exposure and risks are unevenly distributed despite the common spatial feature of volcanic proximity. Exposure to volcanic hazard in Chaitén is disproportionally distributed between people settled to the North and South. The North sector counts with flood protections that mitigate its exposure to potential volcanic mudflows that may be produced in future eruptions, while the South sector lacks such measures (see Figure 5.22, page 230). More importantly, the 'origins' of this imbalance or, to use the PAR terminology, its 'root causes' point to the decision-making process headed by authorities who are far removed in time and space from the affected location. Three particular decisions affected the 'uneven distribution of risk': i) aborting the New Chaitén relocation project, ii) reconsidering the North sector as habitable in 2010 but maintaining the state of 'uncertainty' about the South sector, iii) and postponing the expansion of housing development. These had an important impact on the number of people – i.e. 200 families by late 2014– that informally reside in the South sector at present Policy responses aimed to support the entire community, but failed in facilitating the

development of multi-scale partnerships between stakeholders –including extra-local actors– and in providing appropriate and timely solutions. As other documented cases have suggested (Bicknell et al., 2009; Gero et al., 2011; Pelling and Wisner 2009), successful disaster management efforts are those that include major and minor scale actors, allowing "local strength and priorities to surface in disaster risk management, while acknowledging also that communities –including local government– have limited resources and strategic scope and alone cannot always address the underlying drivers of risk" (O'Brien et al., 2012, p.464).

The analysis of local leaders' narratives and voices, collected in Chapter Five, pointed to an 'erosion of trust in authorities'. The lack of trust can negatively shape vulnerability by altering evacuation strategies as well as by diminishing the effect of compensatory and recovery policies (Cutter et al., 2003). Although trust in authorities is somehow 'observable' at local level, its root causes are linked to the fact that decision-making and policy responses are applied by temporally and spatially distant actors. Several of the evidences collected in interviews pointed towards the same idea: in case of an eventual volcanic eruption, people will not follow authorities' instructions, and it will be difficult to 'believe' again in what authorities say. In other words, Chaitén's people may react negatively to the idea of evacuating the city again in case of future extreme events. Six situations propitiated the 'erosion of trust in authorities':

i) 'Misinterpretations' by authorities about the existence of a volcano in the area, as well as the early and wrongly conclusions on the 'tremors' days before the eruption,

i) the splitting up of families during the evacuation, as well as the false statement that they could return to their belongings days later,

ii) poor supervision over spending of public money that triggered several investigations about irregularities and misuse of public funds by authorities,

iii) the lifting of the ban to inhabit the North sector but not considering the South,

iv) the abandonment of the New Chaitén project after two years of planning, 'spending', and consulting efforts,

v) and the creation of a 'parallel' authority –the Presidential Delegate– that bypassed regional and local authorities.

Because its historical roots in de- centralising and centralising strategies of the Chilean state formation (see sections 4.2.1 and 4.2.2, pages 134 and 139 respectively), the mode of operation of the Chilean DRM in the case of Chaitén reflects a centralised and top-down governance system. Although much of the recent literature on DRR stresses the importance of good governance as a key factor that creates an enabling environment for risk reduction policies and programmes (UNISDR, 2009b, 2015b), Scott and Tarazona (2011) assert that an important majority of countries operated with centralised and top-down models of management. In a certain way, we can say that what we found in Chile is corroborated and confirmed by different disciplinary research on disasters.

The *2015 Global Assessment Report on Disaster Risk Reduction* (GAR) (UNISDR, 2015a) points to poor governance as a key underlying risk driver. But in Chaitén it was not 'poor governance' or 'weak policy responses' alone that created the conditions to reproduce risks or create new ones. Rather, it was that the verticality of the model of management somehow obstructed the inclusion of local actors. In other moments of the post-disaster phase, as during the New Chaitén relocation project, it seems that good DRM governance not only was dependent on its own internal arrangements but also on a broader context of existing governance systems. How the presidential elections and the change of the central administration precipitated the end of the New Chaitén project are good examples that disaster governance is intertwined with a multiplicity of actors and political processes. It seems that the DRM model of Chile works well to respond to emergencies and reducing fatalities, something that has been highlighted nationally and internationally (American Red Cross Multidisciplinary Team et al., 2011; Kaufmann, 2010; López Tagle and Santana Nazarit, 2011; MAE Center et al., 2010). But Chaitén

sheds light on how policy responses to disasters, when they do not provide sound, participatory, and timely solutions, could facilitate the production and reproduction of unsafe conditions, and contributing to and perpetuating the generation of risks over time.

### 6.1.2 Root causes of disaster vulnerability are often distant

Although Wisner et al. (2004) developed an analytical framework to consider root causes of vulnerability and risks, these concepts have been criticised for being too generic (DKKV, 2012; Birkmann, 2011). For instance, they are based on a widely-used definition[41] of disaster risk to identify root causes of disasters as a result of different development patterns that determine dynamic pressures, which then shape a range of unsafe conditions. According to the DKKV (2012), this view is limited as they present more general or "macro-economic root causes […] based on the perspective of political economy" (p.14) and therefore, in some cases, underestimate "the role of context specific and local root causes" (Birkmann, 2011, p.1127). Although is clear that context-specific processes are important to define drivers and root causes of vulnerability, this present study raises the issue of which scale we should consider as 'context' specific. A 'context' of disaster risk creation should not be only grasped at one single scale, whether it be local, regional, 'or' national. Rather we should always consider the vertical and horizontal linkages between local 'and' extra-local scales (Brenner 2009). The institutional configuration, functions, histories, and dynamics of any unsafe condition at local scale should be always grasped relationally, in terms of its "upwards, downwards, and transversal links to other geographical scales situated within the broader interscalar configuration in which it is embedded" (Brenner, 2009, p.72). Practically no 'local' processes occur isolated from other territorial units, making it imprecise to speak of root causes in single-scale terms. Such formulations misleadingly imply that, from a local scale, the multiplicity of factors that create vulnerabilities and risks at local level

[41] "hazard × vulnerability* = risk → disaster" (Wisner et al. 2004, p.49). *root causes, dynamic pressures, and unsafe conditions.

can be contained and coherently grasped. This, however, ignores the essential task of analysing the relational nature of the progression of vulnerability.

The second question posed earlier in Chapter Two: **Why have policy responses to disasters in Chaitén not effectively reduced vulnerability?** was made with the intention of understanding how certain causes and drivers such as policy responses and decision-making may have influenced the 'materialisation' of vulnerability in Chaitén. Specifically addressed in Chapter Five, the features of 'centralisation', 'top-down decision-making', and 'reactiveness' of the DRM model were diagnosed as historically reproduced in the manifold dimensions on how the state is structured. Built on the national concentration of powers and in a process of 'administrative' and 'vertical' decentralisation with little intention to redistribute economic and political powers to regional and local levels (Montecinos, 2013), this 'context' has influenced the managerial model of DRM and DRR in Chile, especially influencing policy responses and decision-making.

The territorial structure of the Chilean state is representative of a 'centralised' scalar organisation where most of the economic activities, people, and opportunities concentrate in the Santiago Metropolitan Region (SMR) –see section 4.3 in Chapter Four. Such structure, established by its history of socio-economic and political struggles, is influencing the geographical distribution and hierarchical organisation of disaster management decisions and its relative budgeting: from the National Emergency Office (ONEMI) to the Territorial Planning Instruments (IPTs), and Municipal Emergency Plans (MEPs).

As Chapter Four points out, IPTs and several legal frameworks –such as the Law N°19,175 on regional and municipal powers, the Law N°18,695 on municipal attributions on security, and the Regional Plans of Territorial Planning or PROTs– aim to 'transfer' the autonomy of dealing with preparedness, prevention, reduction of exposure and promotion of resilience from national to regional and municipal levels. However, Chapter Five confirmed that such 'autonomy' has not been really concretising in DRM and DRR governance arrangements that considers local needs,

priorities, and capacities in Chaitén. Policy responses to the Chaitén disaster, such as compensatory measures, relocation, and reconstruction. were the result of the national government's decisions. This move was further supported by the decision of the central government in 2008 to create a 'parallel' authority named 'Presidential Delegate'. This literally bypassed local and regional authorities when dealing with recovery, relocation, and reconstruction of Chaitén.

Finally, as described in the previous section, policy responses to the Chaitén disaster were ineffective in avoiding the (re)production of vulnerabilities because they did not consider local realities and lacked long term plans that effectively integrate local actors and people, as well as their ideas and concerns, from the very moment of evacuation until even today. Whether this should not be treated as a simple uncritical support of DRM and DRR 'decentralisation' –in part because literature have not empirically demonstrated that 'decentralisation' *per se* is positive or negative (Scott and Tarazona, 2011) or its unfinished open discussion (Garschagen, 2016)–, the central point in question here is that a national model of DRM would be always embedded in broader existing governance system –either centralised or decentralised, national and/or regional such as in the EU[42]. And this national governance system would ultimately influence the form and content of any national DRM models. In the case of Chile, the findings in Chaitén suggest that inclusive risk governance will not be possible unless deeper institutional configurations of power and political will are overcome in the first place.

From another perspective, Chapter Five demonstrated that specific risks in Chaitén are not only the result of presence or proximity to the volcano –the 'natural' hazard –, rather, its vulnerabilities materialise and risks emerge because of a series of decision-making and policy responses during the post-disaster phase. During that period (2008 and 2014), the analysis of Chaitén allows us to see that policy

[42] More and more, member states of the European Union (EU) see how the economic and social integration is altering national governance systems –e.g. through EU laws and directives–, this posits changes also in the arena of managing disasters and recovery –see for instance the EU Parliament resolution on stepping up the Union's disaster response capacity (European Parliament, 2008).

responses to disasters, although well intended, have contributed to generate new and reproduce previous vulnerable conditions. Specifically, the informal settlement in the South sector of Chaitén and the uneven distribution of risks between North and South were unforeseen effects of, or at least mediated by, policy responses and decision-making. The reasons why these have not effectively reduced vulnerability in communities is because the centralisation of the Chilean state has influenced the top-down model of managing disasters and its policy responses. These, in turn, were ineffective in preventing the generation of new unsafe conditions because inadequate reconstruction planning and poor participatory mechanisms did not effectively consider local actors and people, as well as their ideas and concerns.

## 6.2 Methodological and empirical implications

Chapter Three reviewed different schools of thought and approaches on the causation of disasters and its related discourses. They were examined to place the question of the multi-scalar progression of vulnerability at a suitable junction within the discussion: at the crossroad between causation and progression of vulnerabilities. The discussion on the causation of disasters has focused on the dialectic of natural and human-made systems (Bankoff, 2006; Quarantelli, 1987b). Some authors such as Turner, Kasperson et al. (2003), Turner, Matson, et al. (2003) and O'Brien et al. (2004) have focused on the characteristics of social-ecological systems –biological, biophysical processes, and social systems made up of rules and institutions that mediate use of resources– to highlight people's agency and resilience to disasters, as well as on responsibilities of social systems over environment change.

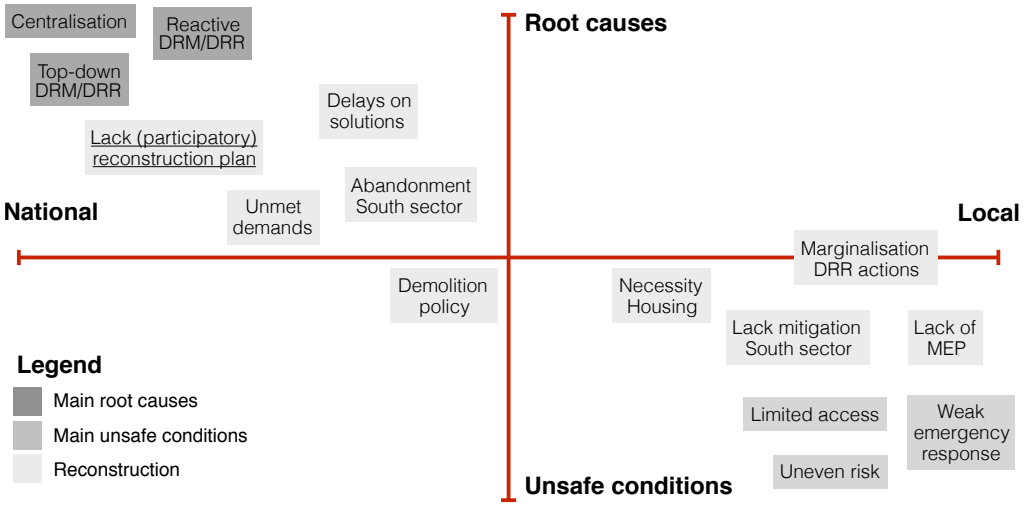
Others such as Wisner et al. (2004), Bankoff et al. (2006), and Gunewardena and Schuller (2008), have focused on the social relations, structures of domination, and politics behind the production of disaster vulnerability, assuming this is as a determinant aspect of disaster causation. Building upon the latter, the re-problematisation of the progression of vulnerability and risk from a multi-scalar perspective may have several implications. The first of these implications refers to

methodological aspects and visualisation of the progression of vulnerability., whereas a second implication concerns about guidance for policy and practice.

### 6.2.1 Considering a multi-scalar perspective

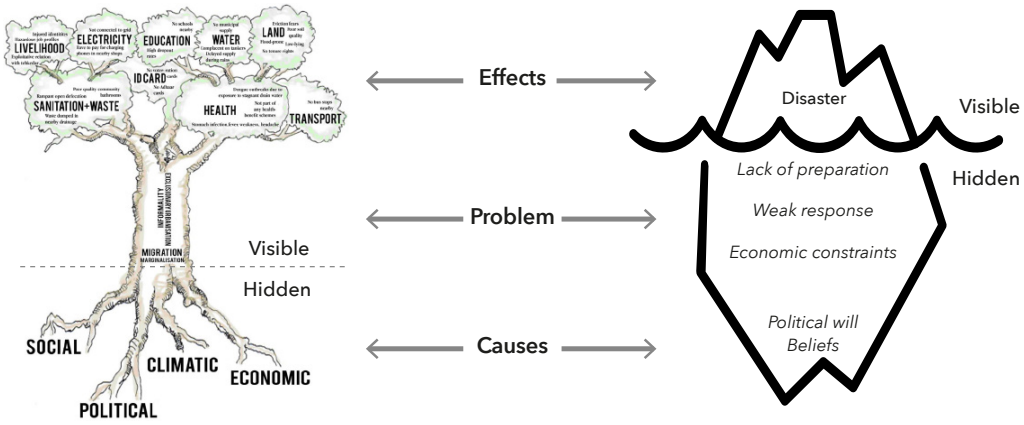
Methodologically speaking, the incorporation of a multi-scalar perspective is the main implication and contribution of this thesis to the analysis of risks. Synoptically, this implication could be reflected in the scatter diagram displayed in Figure 6.3 below, where root causes, dynamic pressures, and unsafe conditions are plotted according to their scalar relations. In this example, causes and drivers concentrate on the process of reconstruction of Chaitén, reusing the example mentioned above (see Figure 6.2).

**Figure 6.3. Scatter diagram of vulnerability progression, Chaitén reconstruction phase**



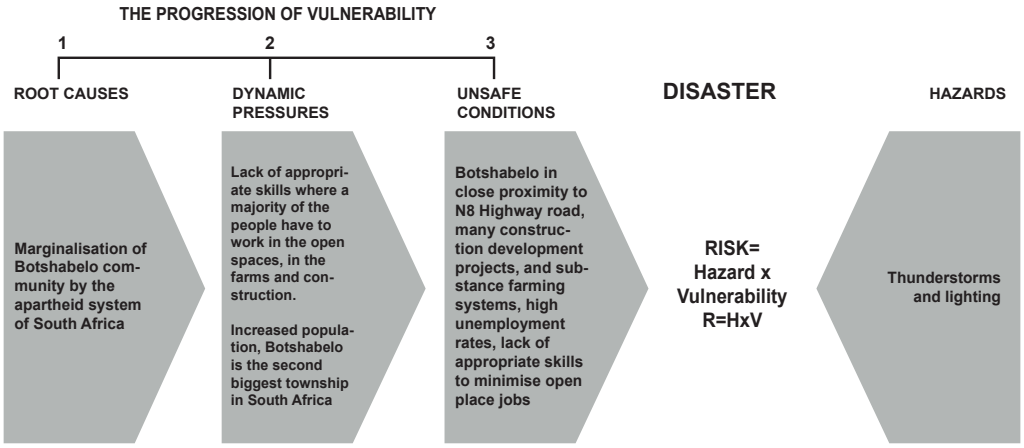

However, the way of grasping and organising causes and drivers as proposed here cannot be disassociated from more traditional methodological approaches to conceive and apply the PAR model. Such unidimensional viewpoints are still dominant among PAR-focused disaster studies as they generally reflect lineal causal and outcome factors in form of 'problem trees' (Michael et al., 2017), 'iceberg diagrams' (Canadian Red Cross Society, 2008), or mimicking the PAR model layout (Moeketsi, 2017) to denote underlying causes of risks, vulnerabilities, and disasters (See Figure 6.4 and 6.5).

**Figure 6.4. Two common diagram usages in PAR model analyses**




*Sources: elaborated by the author (2017), based on Michael et al. (2017, p.6) and Canadian Red Cross (2008, p.23)*

**Figure 6.5. Progression of vulnerability in Botshabelo, South Africa**



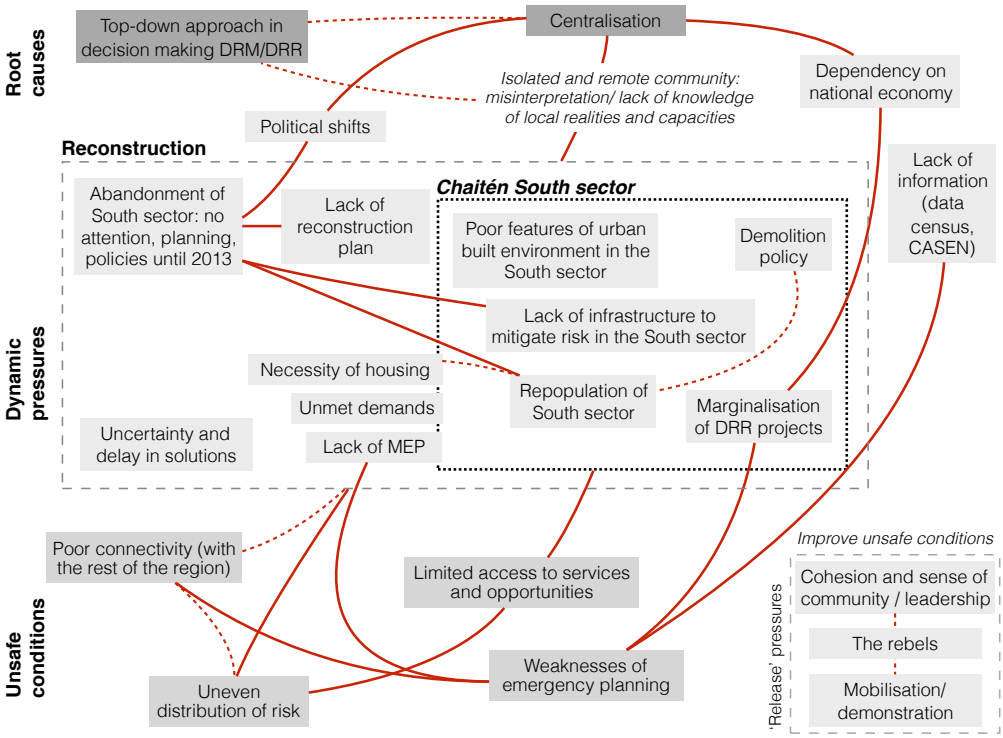

*Source: Moeketsi (2017)*

Nevertheless, the multi-scalar analysis compacted in a bi-dimensional scatter diagram such as in Figure 6.3[43] requires a previous progression analysis as summarised in Figure 5.29 in Chapter Five. The figure below is recalled from that

[43] See more complete examples in Chapter Five –Figures 5.13, 5.17, 5.21, 5.29, and 5.30.

figure to illustrate how certain processes and decisions during the reconstruction of Chaitén relate to each other –in form of a 'problem tree'– to produce unsafe conditions.

**Figure 6.6. Progression diagram of vulnerability during the reconstruction in Chaitén**[44]

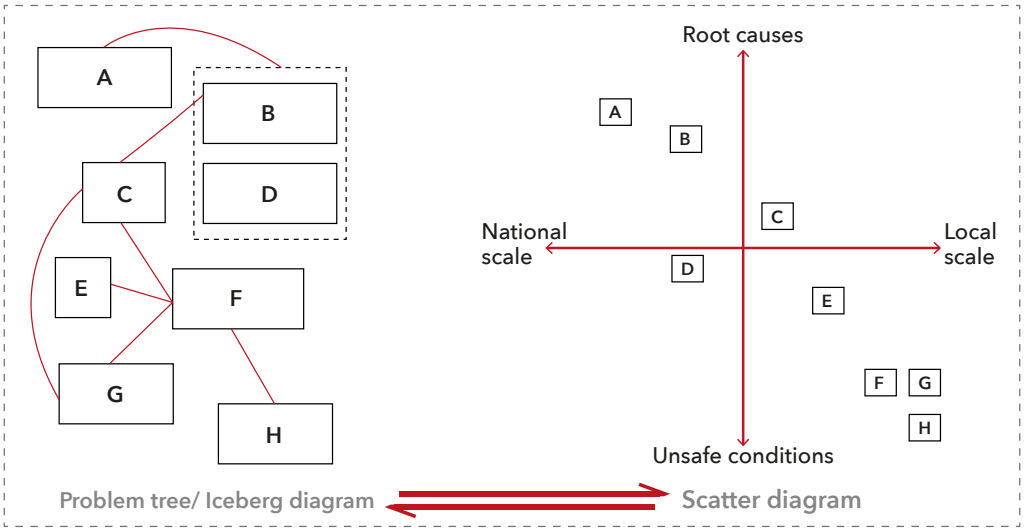



*Sources: elaborated by the author (2017)*

This exercise of arranging causes and drivers of, for instance, 'limited access to services' allowed us to initially identify and establish the causal relations between the analysed elements. But both 'pictures', the 'problem tree' and the 'scatter diagram', need to be read together because of their complementarity (see Figure 6.7). In the figure below, letters 'A, B, C…' represent elements of the progression of vulnerability plotted differently for each diagram.

[44] A detailed explanation of this diagram is made in Chapter Five (pages 242-243), this is displayed here to illustrate a 'problem tree' diagram.

**Figure 6.7.**
**Complementarity of diagrams for analysing the multi-scalar progression of vulnerability**




*Sources: elaborated by the author (2017)*

But beyond these visual representations, perhaps the main contribution of this thesis lies in trying to go further from these traditional approaches in disaster research –problem trees and iceberg diagrams–, as visualisations not only to communicate information but to make sense of data (CASCADE project, 2013). And with more cases in the future, it would be possible to discover if root causes, dynamic pressures, and unsafe conditions are associated with or dependent on certain territorial scalar configurations: for instance, decentralised and centralised forms of governance.

### 6.2.2 Guidance for policy and practice

In empirical terms, this thesis contributes to advancing policy responses to disasters in the context of Chile in at least three areas. These are oriented to avoid the (re)production of vulnerable conditions:

- Holistic and planned evacuations that include local participation
- Long term plans and timely solutions
- Decentralisation of disaster risk management

*Holistic and planned evacuations*

In Chaitén –but also in other cases in Chile (León, 2012)–, evacuation processes pointed out the importance of men and women's participation in such important decisions. Their involvement helps them to keep control over their future and their opportunities, as well as creating trusting relations with government institutions and authorities essential to secure quality, equity, and sustainability of post-disaster programmes (Gall et al., 2014).

The analysis of public polices linked to managing and reducing disaster risks shows that Chile counts on ambitious national plans and holistic views. However, these were not well adapted to promote long term plans and sustainable solutions for both North and South sectors of Chaitén. Even though Chaitén may constitute only one particular example, the analysis of the national DRM suggests that centralisation, top-down approach, and reactiveness are systemic features of the model of DRM and DRR. This may mean that unforeseen effects of policy responses –including forced evacuations– may have contributed in the past and may contribute in the future to reproduce risks in other cases.

Some indications of this may be found in other Chilean cases such as in Lilco during the 2010 Maule earthquake (Imilan et al., 2015). The case of Lilco describes the slowness with which the state support arrived after the earthquake, and how the inhabitants were marginalised from planning processes and during the implementation of reconstruction projects. As a result, policy responses failed to utilise people's knowledge and organisational capacities. According to Imilan et al. (2015), in Lilco and elsewhere in Chile, post-disaster reconstruction processes miss the opportunity to improve living conditions for the affected communities and to develop policies for disaster management that incorporate and use their social capital. Then, it is fair enough to say that policy responses in Chile continue focusing on life saving and attending basic needs as this save lives. Nevertheless, everything seems to indicate that, without 'right to information', 'participation', and 'securing the

continuity of daily life' after disasters, forced evacuations may (re)produce new and unforeseen vulnerabilities.

*Policy responses with long term plans*

Although well intended and apparently well designed, the New Chaitén plan failed in eluding political pressures and economic constraints within a period that took longer than desired –almost three years since the volcano eruption in 2008. In general, recovery and especially reconstructions are not immune to political and economic pressures (Lyon et al., 2010). At least in Chile, when post-disaster processes extend longer than expected, such tensions tend to easily escalate (Platt and So, 2017; Santiago Research Cell, 2015). Then, as the New Chaitén project demonstrated, 'time' becomes a tangible thing that needs to be seriously considered in policy responses. From this point, planning tools such as 'scenario planning', 'contingency plans', as well as IPTs, take special relevance in dealing with time pressures and uncertainty. Policy responses that consider recovery as a long-term plan, inclusive and participatory, can serve to create systematic decision-making through decisions that can be made in advance concerning potential contingencies, as well as to avoid to reproduce unsafe conditions. For example, Chad Briggs (2011) uses the 2010 Eyjafjallajökull volcano eruption in Iceland to illustrate how 'scenario planning' for designing, testing, and maintaining contingency plans related to volcanic activity in Europe may help to reduce impacts and losses.

*Decentralisation of disaster risk management*

The GAR 2015 (UNISDR, 2015a) and the Sendai Framework (SFDRR) (UNISDR, 2015b) emphasise the importance of local governments in disaster risk reduction, highlighting the 'positiveness' of decentralised models disaster risk management. However, there is still limited empirical evidence that confirm this (Garschagen, 2016; Grady et al., 2016; Scott and Tarazona, 2011) and that document the critical barriers to achieve it. This thesis, in that sense, acknowledges and endorses the importance of local governments, by suggesting that the lack of inter-sectorial and

multi-scale planning, as well as poor inclusion of local actors, have been main obstacles for successful DRR in Chaitén. But besides this, or perhaps more importantly, the nature of such obstacles are apparently in the way the territorial structure of the Chilean state is organised and constructed. This may constitute one of the barriers to truly transfer power –especially on decision-making: financially and politically– to local governments in terms of DRM and DRR. Some ideas that may help to advance a true decentralised disaster risk and risk reduction management:

- Create awareness among national, regional, and local actors about the 'transversality' –inter-sectorial and multi-scale– of DRM and DRR. An effective decentralisation of disaster risk management may not only consist in an administrative de-concentration –or 'vertical decentralisation'– of state functions, but in a true balance between national, regional, local capacities with equal decision-making. Awareness certainly involved research and communication but it may work by incentives such as showing financial information to authorities and politicians about the cost of future disasters versus the possible savings that DRR can potentially secure; including DRR activities within job descriptions/requirements and performance assessments for regional and local officials; and the importance of citizen participation in DRR through public campaigns that show how pressure from citizens on their locally elected politicians can encourages these officials to take direct and specific DRR actions (Scott and Tarazona, 2011).

- Enabling local capacities in disaster risk management by strengthening institutions and mechanisms at lower levels of the territorial organisation. In Chile, regional academic institutions have demonstrated usefulness in providing DRR skills that local governments do not have, for instance, in disaster risk assessments, risk mapping, participatory strategies, and even with infrastructures and facilities (UNESCO et al., 2012). Likewise, regional and local NGOs and civil societies alike have demonstrated the ability to create awareness and mobilise local communities about their own capacities and agency (Korten, 1990; Alemneh, 2003; Aravena and Sepúlveda, 2011).

- Decentralisation of disaster risk management requires decision makers to effectively allocate national funds into local governments. Scott and Tarazona (2011) point out that local DRR funds are easily diverted to other projects and priorities or even more dangerously, not used and so returned to the central government. One idea to secure effective DRR funding may be articulating local development, climate change adaptation, and DRR agendas. In 2015, three high-profile global agreements for development were achieved: the Sendai Framework for Disaster Risk Reduction 2015-2030, the Sustainable Development Goals (SDG), and the Paris Agreement on the COP21. These post-2015 agendas share, join, and embrace common objectives such as tackling impacts and losses as a result of climate change. According to Roberts et al. (2015, p.1024), "framing post-2015 development as a means to address loss and damage can synergize these agendas". For instance, poverty reduction and sustainable development play a crucial role in preventing vulnerability and building resilience to climate change. Efforts to address climate change should therefore build on robust sustainable development and poverty reduction policies and plans, which will increase the extent to which losses and damages can be avoided Roberts et al. (2015).

- Decentralisation of DRM does not mean a weak national governance system. On the contrary, some evidence (Scott and Tarazona, 2011) points out that effective decentralisation requires an active national leadership: "strong regional and local DRR is more likely when there is a strong national entity that provides oversight and enforcement" (Scott and Tarazona, 2011, p.26). The thesis shows precisely that the ONEMI (national) lacks enforcement and compliance mechanisms at local level. So, effective decentralisation of disaster risk management would require the giving of such mechanisms to the ONEMI, or another national actor. This also means that a decentralised model of DRM should consist in a 'constant' leadership –not only during emergencies– in enabling and strengthening local and regional capacities to deal with pre- and post-disaster actions, to the point that its 'function' seems unnoticed and completely normalised in the everyday management and responsibilities of local institutions. Likewise, a national leadership should also focus on the

underlying causes and drivers of disaster vulnerability as they are often distant from local and regional levels and capacities. This view differs from the current model in Chile, where the ONEMI and the central government appear overwhelmingly more relevant than other institutions and actors at lower levels –the top-down approach utilised to conduct the evacuation, relocation, and reconstruction of Chaitén are good examples.

Following these recommendations, this thesis points out that the current situation in Chaitén may be also improved, firstly –although superficially–, by improving access to services and opportunities to *Chaiteninos* residing in the South sector. This would help to increase their capacities as well as enable favourable circumstances for all residents. However, improving access would not solve the problem alone. This requires that the 'uncertainty' of the future of the South sector would to be solve. If the central government and the Congress decide to keep or lift the ban to inhabit the sector, the trust in authorities and institutions need to be also restored and strengthened, especially in regard to the regional and national institutions.

### 6.3 Some reflections on the research experience

Once the study was concluded, I initiated a process of reflexibility on the research decisions I made and the directions I took. Some of the factors that influenced these came from my own personal history. I am a mestizo, heterosexual, cisgender male, and I have lived in southern Chile for most of my life. Prior to conducing the research study, I worked in territorial planning at a regional office in La Araucania Region. My experiences working with diverse regional and national actors influenced my interest in the territorial imbalance between national and regional levels. Finally, my studies in Berlin and my experience with the earthquakes in Chile and Haiti in 2010 ultimately led me to focus on the causation of disasters. Through conversations with affected people and volunteers, I heard stories in which people shared their struggles with the impacts of disaster in very different ways, depending on their locations, the social group they belong to, their economic resources, social networks and the like. I initiated this research in the hope of developing an understanding of the ways in which these territorial imbalances mediate the causation of disasters.

By acknowledging who I am as an individual, and as a member of a group, and as resting in and moving within a social position, I had to be careful not to attempt to speak for research participants both at national and local levels. Instead, I tried to reflect their voices as an ally and advocate, although always contrasting their perceptions with the existing literature. I took a similar attitude to dealing with my positionality, as I always tried to share and discuss my appreciations with more experienced colleagues in the field, and to confront these on literature.

During the research I became particularly interested into how policies to disasters associated with long-term processes, such as relocation and reconstruction, may affect future disaster vulnerability. Disaster vulnerability research has, during the years I was preparing this study, been competing with 'resilience' research (Miller et al., 2010). Though resilience has become a popular concept among academic circles and development agencies alike, criticism has been raised, considering it to serve neoliberal politic purposes, "which shifts the burden of recovery –and implied blame– to individuals and communities themselves" (Brown, 2015, p.191). Having this in mind, I decided to take the opposite direction to turn into the core of vulnerability and analyse the progression of vulnerability as a multi-scalar process, embedded within a governance system of disaster management. As pointed out in Chapter One, this was done with the idea that the more studying we dedicate to the implication of causes and drivers of disasters, the more powerful will be the reasons to mobilise men and women and authorities towards a disaster risk causation and reduction thinking. Otherwise, as Wisner et al. suggest "[disaster] problems will recur again and again in different and increasingly costly forms unless underlying causes are tackled" (2004, p.61).

On the other hand, during the development of the thesis, there was a growing interest among some academic circles for moving forward to the tackling of disaster risk creation, instead of simply seeking disaster risk reduction (Oliver-Smith et al., 2016). As noted by Lewis and Kelman (2012), this requires more detailed investigation into these multi-scalar and historical realities of the causes of

vulnerability, which would support the integration of disaster risk reduction within the many wider contexts that foment and perpetuate vulnerability. Such developments corroborate that this thesis goes in the right direction.

The research process had to undergo various transformations and overcome several challenges throughout all these years to reach this final stage. This revealed its non-linear nature, the inherent complexity of social phenomena, but also my own positionality within the research process and disciplinary debate. Some reflections about my position within this study were already introduced in this section and in Chapters One and Two, but now I would like to offer a brief projection of my positionality in the future.

At the end of the research, I was more conscious about my position as a 'male' within a system of unequal gender relations, where women and girls are relatively less powerful and often materially deprived in almost all cultures (Cannon, 2014), and this is a significant factor in making females more vulnerable to some types of hazards (Habtezion, 2013). And although I did not consider gender relations as a root cause to be analysed in the case of Chaitén, being aware of this will make me to reconsider such gender relations, as well as my position within these relations, in future investigations. I strongly believe that to advance disaster risk reduction necessarily we should advance also on equal gender relations.

A similar positionality applies for the area of disaster research when I recognise myself as a Chilean. Because my personal experiences with hazards and risks in Chile, related to the country's location and long history with disasters —as well as of disaster-related institutions—, my initial perceptions about how disaster and risk management operate was mediated by such personal experiences. For instance, my experience with disasters, democracy, the inequalities of neoliberalism and centralisation, the strength of national institutions in Chile, among other elements of the contemporary Chilean context, moderated my positionality about the important role that institutions play in emergencies and recovery. But also because I grew up in

a remote region in Chile, La Araucanía, my position about the necessity to redistribute power and opportunities among the national territory is very clear.

Being a Chilean who has studied abroad, especially between Germany and the United Kingdom, has established my positionality in regard to my future role with, and viewpoints about, Chile and its model of DRM. When I come back to Chile, specifically to La Araucanía Region, my experiences mainly with European institutions, and development and disaster risk discourses, will mediate my perspectives on Chilean institutions, social relations, and the like. In this regard, I consider it fundamental to review my own positionality from time to time when relevant personal or external societal transformations take place, as our positions are dynamic and vary depending of our experiences throughout life (Throne et al., 2016).

To end this journey, I would like to offer some suggestions for further research.

## 6.4 Call and suggestions for further research

*Further case-based analyses in Chile that look at disaster risk creation and the root causes of vulnerability and risk*

One of the motivations to conduct this research was that there were few studies dedicated to understanding and documenting the underlying and socio-economic/ political causes and drivers of vulnerability and risk in Chile. Further research using the PAR model, or other similar analytical frameworks, may contribute to systematise root causes and dynamic pressures of vulnerability in different cases. This may, in turn, allow us to contrast and compare drivers and causes beyond the nearness of each case, to try to identify patterns within the model of DRM and risk governance in Chile. As mentioned in the previous section, there is a growing interest in some academic circles, such as within the group RADIX, in the idea that governments and institutions should acknowledge and take action to tackle disaster risk creation (Oliver-Smith et al., 2016). In the 2017 Global Platform for Disaster Risk Reduction, taking place on 22-26 May in Cancun, Mexico, there will be several sessions that aim

to discuss and present advances on the governance of risks and disasters and accountability, as a fundamental perspective on advance disaster risk reduction. Nevertheless, there is still a need for further case-based research at the country level, including Chile, that looks at the root causes of vulnerability, as well as the governance and accountability of disasters and risks.

*'Perspective of scale' to disaster vulnerability, and with attention to other forms of state territorial organisation.*

The GAR 2015 (UNISDR, 2015) points out that in order to develop a comprehensive analysis of disaster vulnerability and to integrate topics like environment and society, vulnerability assessments need to be aware of scale implications. Vulnerability assessments and scales are highly intertwined, not only in technical application but also in conceptualisation (Fekete et al., 2010). Chaitén is embedded in a particular scalar system of risk and territorial governance historically mediated by political and social tensions. Its resultant centralisation and top-down approach have influenced the post-disaster Chaitén, and it will influence other cases in Chile insofar as its scalar system of governance continue evolving over time. Although this makes the case study and thesis quite specific, further research could be developed on the light of other –different than Chile– state territorial structures, where different political-administrative spaces exist and other scalar configurations dominate –e.g. federalist systems, global-cities, urban-regions, and metropolitan areas, among others.

*Evacuations*

Emergency evacuation research has often looked at the behaviour of people during disasters: what people are likely to do, when they are likely to do it and how they are likely to do it, but rarely on the role of institutions and decision-making (DeYoung et al., 2016). The evacuation of Chaitén points out the importance of people's participation in decision-making as well as their 'right to information' and continuity of daily life. Unfortunately, beyond the case of Chaitén there is not strong evidence based on other cases that demonstrate how these may help to better articulate

evacuations, displacements, resettlements, as well as forced migrations, to longer term policy responses such as compensatory strategies and reconstruction processes (Kates et al., 2006). Further investigations on past and future disaster evacuations in regard to some elements observed in Chaitén such as 'right to information', 'participation', and 'continuity of daily life' may ultimately help to develop better policy responses in this respect.

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# Appendices

## Appendix 1. Research participants

For practical and ethical reasons, explained Chapter Two on the methodology, I decided that all research participants should be protected in terms of confidentiality and anonymity. In order to facilitate reading and understanding, fictitious names are used for the interviewees while gender, institutional affiliation, position and date of interaction is provided.

***List of participants: interviews and focus group***

**Reference codes for affiliation/group:**

*MI: Ministry of Interior and Public Security*
*OM: Other Ministries –e.g. Education, Health, Finance.*
*CS: Civil Society organisations*
*AP: Academia and Practitioners*
*LP: Local leaders and Chaitén people*

| Ref. cod. | Fictitious name | Gender | Institution | Position | Date of interaction |
|---|---|---|---|---|---|
| AP01 | Heinrich Schmidt | Male | Academia Inter. | Director | Mar., Sep. 2013 |
| OM01 | Mónica Álvarez | Female | Congress | Member | December 2014 |
| MI01 | Carlos Villalobos | Male | National gov. | Director | July 2013 |
| MI02 | Pablo Benavente | Male | Regional gov. | Director | July 2013 |
| MI03 | Rafael Montenegro | Male | National gov. | Official | March 2013 |
| MI04 | Javier Martinez | Male | Regional gov. | Official | March 2013 |
| AP02 | Gabriela Miranda | Female | National consultant | Expert | Apr.,Jul. 2013; Nov., Dec. 2014 |
| CS01 | María Fernandez | Female | National consultant | Expert | March 2014 |
| AP03 | Mauricio Fuentes | Male | Academia national | Director, Expert | Mar., Apr. 2013; Dec. 2014 |
| AP04 | Mónica Acevedo | Female | National consultant | Expert | December 2014 |
| AP05 | Beatriz Moreno | Female | National consultant | Expert | Mayo 2014 |
| MI05 | Victor Sanhueza | Male | National gov. | Official | April 2013 |
| MI06 | Pablo Gonzalez | Male | National gov. | Director | July 2013 |
| MI07 | Jorge Mardones | Male | National gov. | Director | June 2013 |
| LP01 | Teodoro Benitez | Male | Community | Local leader | March 2013 |
| LP02 | Rosa Carcamo | Female | Community | Local leader | March 2013 |
| OM02 | Pedro Delgado | Male | Local gov. | Director, expert | May 2013 |
| OM03 | Veronica Zarate | Female | Local gov. | Director | March 2013 |
| MI08 | Antonio Gomez | Male | Local gov. | Council member | Mar., Jul. 2013 |
| LP03 | Pablo Carcamo | Male | Community | Local leader | Mar., Jul. 2013 |
| LP04 | Isabel Jimenez | Female | Community | Resident | March 2013 |
| MI09 | Mauricio Poblete | Male | Local gov. | Council member | July 2013 |
| MI10 | Javier Hernandez | Male | Local gov. | Director | Mar., Jul., Sep. 2013 |
| LP05 | Roberta Monsalvez | Female | Community | Local leader | July 2013 |
| LP06 | Marcela Segovia | Female | Community | Local leader | July 2013 |
| MI11 | Ricardo Bosques | Male | Regional gov. | Director, expert | March 2013 |
| LP07 | Patricia Troncoso | Female | Community | Local leader | Mar., Sep. 2013 |
| LP08 | Olga Pineda | Female | Community | Local leader | September 2013 |

| Ref. cod. | Fictitious name | Gender | Institution | Position | Date of interaction |
|---|---|---|---|---|---|
| LP09 | Margarita Salamanca | Female | Community | Local leader | September 2013 |
| LP10 | Ramón Arevalo | Male | Community | Local leader | September 2013 |
| OM04 | Benjamin Vergara | Male | National gov. | Official, expert | Apr., Jun. 2013 |
| OM05 | Jose Morales | Male | National gov. | Official | May 2013 |
| MI12 | Catalina Mujica | Female | Regional gov. | Director, Expert | July 2013 |
| MI13 | Ignacio Saavedra | Male | Local gov. | Council member | March 2013 |
| LP11 | Alejandro Soto | Male | Community | Local leader | July 2013 |
| LP12 | Regina Muñoz | Female | Community | Local leader | August 2013 |
| OM06 | Guillermo Poblete | Male | National consultant | Expert | April 2013 |
| LP13 | María Jose Navarro | Female | Community | Local leader | July 2013 |
| MI14 | Karina Navarrete | Female | Local gov. | Director | July 2013 |
| LP14 | Angela Rodriguez | Female | Community | Local leader | September 2013 |
| MI15 | Federico Rivas | Male | Local gov. | Director | July 2013 |
| MI16 | Guillermo Ugarte | Male | Local gov. | Council member | March 2013 |
| MI17 | Fernando Torque | Male | National gov. | Director | August 2013 |
| MI18 | Roberto Izquierdo | Male | National gov. | Director | December 2014 |
| MI19 | Samuel Rojas | Male | National gov. | Director | August 2013 |
| MI20 | Cristobal Reyes | Male | National gov. | Director, Expert | August 2013 |
| MI21 | Jimena Pozo | Female | National gov. | Director | June 2013 |
| MI22 | Martín Heredia | Male | National gov. | Director | June 2013 |
| MI23 | Felipe Romero | Male | Regional gov. | Director | July 2013 |
| CS02 | Joaquín Opazo | Male | National civil society | Director | Apr. 2013; Dec. 2014 |
| CS03 | Susana Rueda | Female | National civil society | Director | April 2013 |
| CS04 | Alex Montoro | Male | National civil society | Director | April 2013 |
| AP06 | Fidel Puertas | Male | Academia national | Director, Expert | Sep. 2013; Dec. 2014 |
| AP07 | Paola Rua | Female | Academia national | Director, Expert | Sep. 2013; Dec. 2014 |
| AP08 | Juan Pablo Estero | Male | Academia national | Director, Expert | Sep. 2013; Dec. 2014 |
| AP09 | Jaime Montoya | Male | Academia national | Director, Expert | April 2013 |
| MI24 | Joel Chueca | Male | Community | Director | July 2013 |
| OM07 | Leon San Martin | Male | Community | Director | July 2013 |
| OM08 | Heraldo Astudillo | Male | Community | Official | March 2013 |
| OM09 | Justina Murillo | Female | Community | Official | July 2013 |
| MI25 | Rayen Mora | Female | National gov. | Director, Expert | Apr. 2013; Dec. 2014 |
| MI26 | Renato Navas | Male | National gov. | Director, Expert | March 2013 |
| MI27 | Noria Saavedra | Female | National gov. | Official | August 2013 |
| MI28 | Jacinto Tello | Male | Regional gov. | Director | July 2013 |
| MI29 | Ismael Henriquez | Male | Regional gov. | Director | August 2013 |
| MI30 | Rosa Miranda | Female | Local gov. | Director | Jul., Sep. 2013 |

***Descriptive statistics of the sample***

| **Gender** | *N* | *Percentage* |
|---|---|---|
| Female | 25 | 37.9% |
| Male | 41 | 62.1% |
| **Total** | **66** | **100%** |

| **Geographical scale** | | |
|---|---|---|
| National level | 32 | 48.5% |
| Regional level | 7 | 10.6% |
| Local level | 27 | 40.9% |
| **Total** | **66** | **100%** |

| **Institution** | | |
|---|---|---|
| Ministry of Interior and Public Security (MI) | 30 | 45.5% |
| Other ministries (OM) | 9 | 13.6% |
| Civil Society organisations (CS) | 4 | 6.1% |
| Academia and Practitioners (AP) | 9 | 13.6% |
| Local leaders and people (LP) | 14 | 21.2% |
| **Total** | **66** | **100%** |

## Appendix 2. Academic events where feedback was collected.

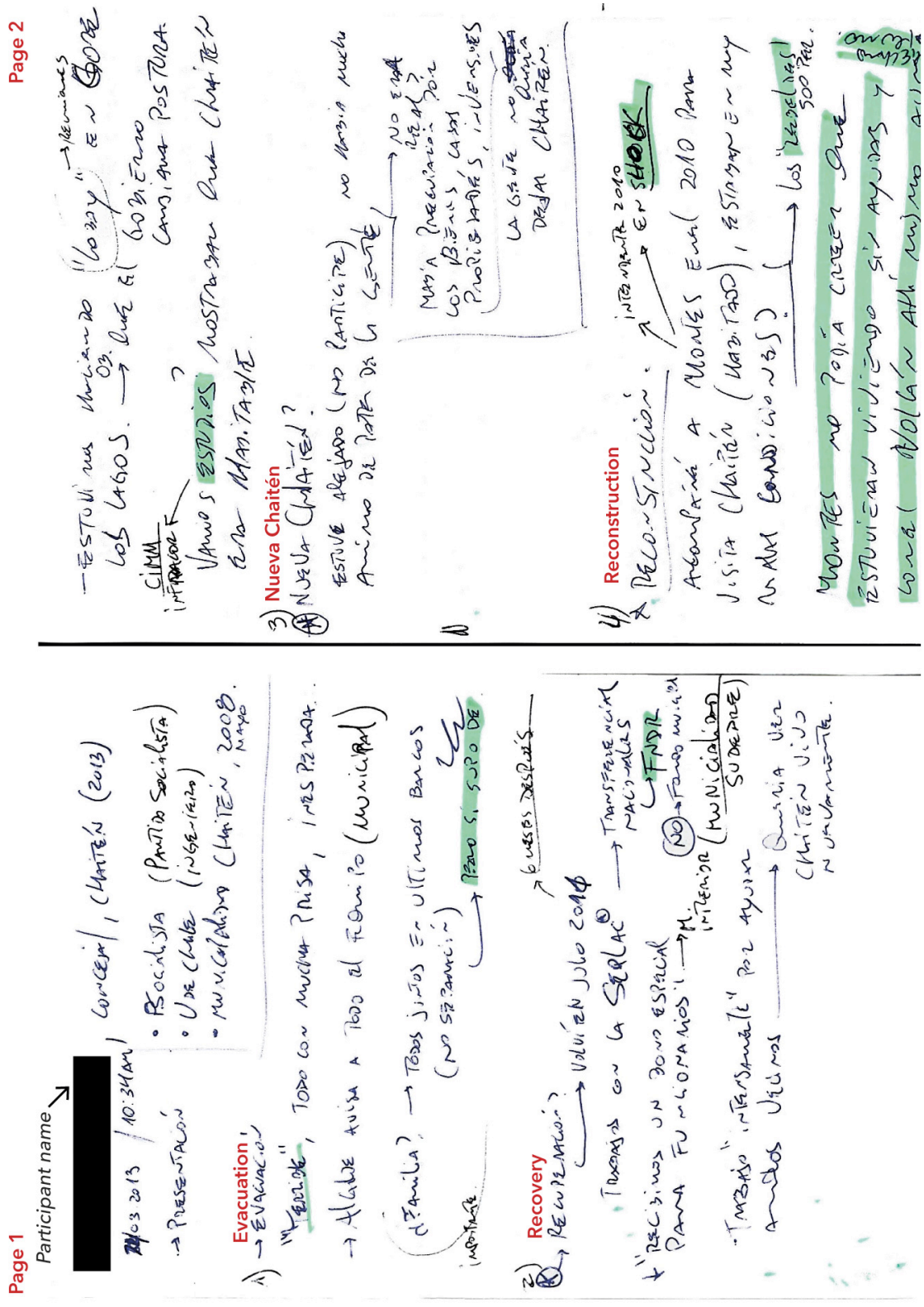
***List of presentations***

- Sandoval, V. (2014) 'The progression of vulnerability A multi-scalar perspective on disaster. The case of Chaitén in Chile' for the *National Research Center for Integrated Natural Disaster Management (CIGIDEN)*. Pontificia Universidad Católica de Chile, Chile, 18th December.
- Sandoval, V. (2014) 'Desastres, Emergencias, y Reconstrucción en Chile' for the *8th International Conference Encuentros ChileGlobal Santiago 2014*. Santiago de Chile, 15th-17th December.
- González-Muzzio, C. and **Sandoval V.** (2014) 'Neoliberalism and reconstruction processes in Chile, discussing the role of State and communities' accepted for *2nd International Conference on Urban Sustainability and Resilience USAR*. UCL: London, UK, 3rd–5th November.
- Sandoval, V., González-Muzzio, C. and Albornoz, C. (2014) 'Resilience and Environmental Justice: Potential linkages' accepted for *4th International Conference on Building Resilience.* University of Salford: UK, 8th–11th September.
- Sandoval, V. (2014) 'The progression of Vulnerability: A multi scalar interpretation of disaster causation' for the *Disaster Research Unit colloquium*. Freie Universität Berlin: Germany, 17th June.
- Sandoval, V. (2014) 'Questioning disaster risk and reconstruction: A multi-scalar inquiry' accepted for the *3rd Shelter Forum 2014*. UCL: London, UK, 12th March.
- Sandoval, V. and Albornoz E., C. (2013) '*La producción de la Vulnerabilidad: Re-interpretando el PAR model a través del caso de Chaitén, en Chile*' accepted for *1st Seminário Internacional de Investigações sobre Vulnerabilidade dos Desastres Socionaturais*. Universidade Federal de Santa Catarina, GEDN, CIVDES: Florianópolis, Brazil, 20th-22nd November.
- Sandoval, V. (2013) 'Community vs. State in Post-disaster Context: Uneven Outcomes on Environmental Justice and Resilience in Chaitén' accepted for the *2nd ChileGlobal Seminar UK on Disaster, Emergency and Reconstruction*. UCL: London, UK, 14th November.
- Sandoval, V. (2013) 'The "scalar" progression of vulnerability: Decisions taken and their effects on local disaster risk'. *DPU Fieldwork Presentations.* DPU-UCL, London, UK, 15th November.

- Sandoval, V. (2013) 'Disaster and Sustainability: Development at Risk' accepted for the *1st International Alumni Conference on Conservation and Sustainable Use of Ecosystems*. Greifswald University: Greifswald, Germany, 11th-17th October.
- Sandoval, V., González-Muzzio, C. and Albornoz E., C. (2013) 'Community versus State in post-disaster context: Uneven outcomes on environmental justice and resilience in Chaitén, Chile' accepted for the workshop *Resilience and Environmental Justice in the Urban Global South*. EJUR Research Cluster, DPU-UCL: London, UK, 12th-13th September.
- Sandoval, V. and Boano, C. (2013) 'The progression of vulnerability: A multi-scalar perspective on disasters, the case of Chaitén in Chile' accepted for *4th EUGEO Congress: Europe, what's next? Changing geographies and geographies of change*. University of Rome, Italy, 5th-7th September.
- Sandoval, V. (2013) 'PhD thesis: The progression of vulnerability: A multi-scalar perspective' for the *Thesis Presentation Seminar at the Research Centre for Vulnerability and Socio-natural Disasters (CIVDES).* Universidad de Chile: Chile, 13th March.

Appendix 3. Interview record

***Excerpt of the interview record to Ignacio Saavedra[1] (24 March 2013)***




[1] Fictional name.

Page 3

- Nos dijo que María todo lo posible...
→ Montes volvió otra vez en Julio pero no pudo ir. × Recuperar Chaitén
→ Algunos locos de que Chaitén se recuperaría → la ciudad histórica.

• La escuela, los profesores, seguían preocupados María mucha esperanza.
Ahora el mayor desafío es unir Chaitén el sur y el norte.

↳ La mani. ayuda → un poco pero se necesitan apoyos mayores; infraest. logística?, ayudas, casas en el norte,

Notes post-interview

Post
Notas: Claudio le puso mucho énfasis a lo de la visita del intendente Montes. se refirió a que M. pudo jugar un papel importante en el cambio de rumbo de los acontecimientos que llevaron a declarar a Chaitén inhabitable en Dec. 2010. Entendí que hasta la visita de Montes, la situación de los Chaiteninos en la ciudad era "desconocida

Page 4

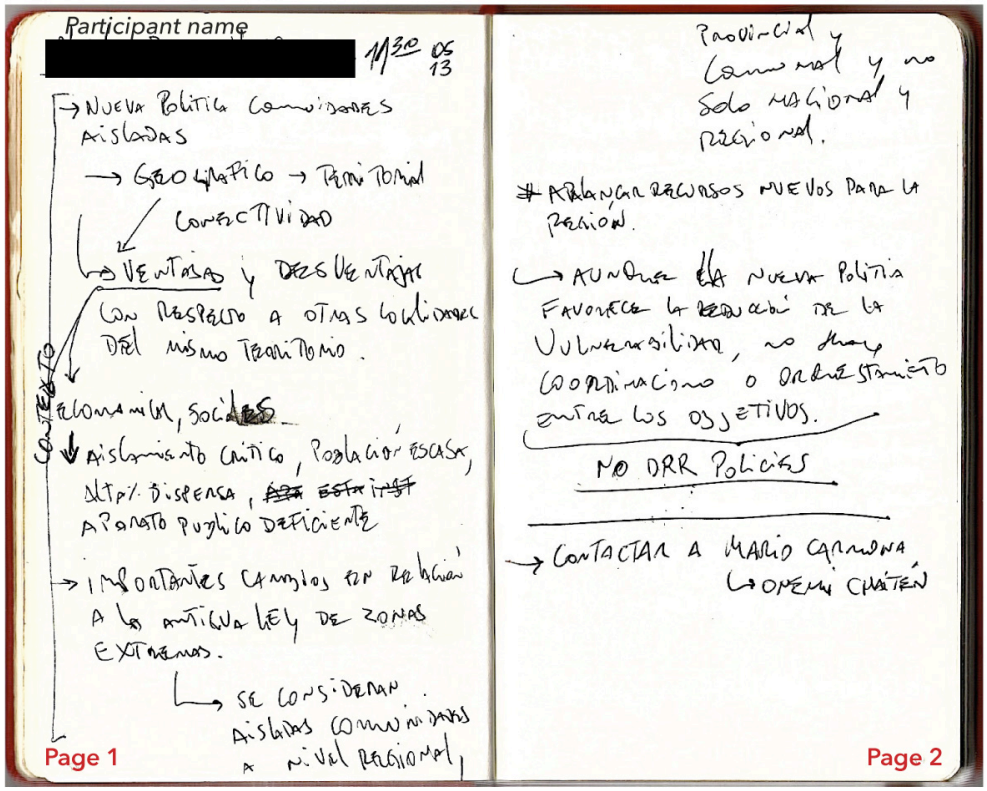
Quotes: Para recordar

"Montes, estaba en shock cuando visitó Chaitén nada más asumir, por él vió que la gente no tenía protección... sin servicios básicos, como abandonados, y el plan pasado."
Nueva Chaitén

"Recorrimos varias calles y visitamos a varias personas,... las condiciones no eran malas, fueron ingeniosos"
estrategias subsistencia

"Yo creo que el Montes no entendía la importancia de la nueva Chaitén"
↳ Por la seguridad.

***Excerpt of the interview record to Federico Rivas[2] (05 July 2013)***




[2] Fictional name.

**Excerpt of the focus group record to community leaders, Chaitén (05 July 2013).**
In Spanish.

**Focus group Chaitén: Líderes de algunas juntas de vecinos.**
5 de Julio 2013. Duración: 1:20 hr
Participantes: [redacted] (B), [redacted] (O), [redacted] (M), [redacted] (E1), [redacted] (E2), [redacted] (R1), [redacted] (M), [redacted] (R2), [redacted] (F).
Entrevistadores: Vicente Sandoval (VS: Moderador), Cristian Albornoz.

Introducción:
1) Equipo CIVDES - Conocer Chaitén - El desastre. → INTRO
2) Evacuación: ¿Como lo vivieron?
3) Recuperación ¿Cómo fueron sus experiencias durante 2008 y 2010, fuera de Chaitén? (Relación Estado-Comunidad).
4) La Nueva Chaitén ¿Cómo vivieron este proyecto? (expectativas, relación con los proponentes/Estado).
5) Volver a Chaitén. ¿Como han sido estos 2 años y medio? ¿qué se ha avanzado? ¿qué falta? (desafíos, problemas, demandas).
6) ¿Cómo ha sido su relación con Paula Naváez (Delegada Presidencial)?

2) LAS DIVISIÓN DE LAS FAMILIAS (*)
* FALTA DE INFORMACIÓN — CULPA ESTADO

3) TODOS → VOLVER → NOSTALGIA (TIERRA?)
LUCHA → ESTADO / ~~GOBIERNO~~ LOS LAGOS / "EMPUJAR" CHAITENINOS
- SE DIJO y HABLO MUCHO → SE HICIERON OTRAS
AL FINAL NADA

4) POTENCIAL → VV } MUY TARDE / DEMORA — NO LOS ⑧ CONSIDERARON

5) TODO MUY LENTO, NOS OLVIDARON.
LOS DEL SUR ESTAN EN UNA SITUACIÓN MUY DIFICIL. AYUDA
* SON CHAITÉN → NO HAY SEPARACIONES — EL RÍO NO ES PROBLEMA ?
EN INVIERNO SUFRIMIENTO
DISTANCIAS
NIÑOS / FAMILIAS MAYORES.
SENTIDO DE CIUDAD (COMUNIDAD)

1 de 2

Page 1

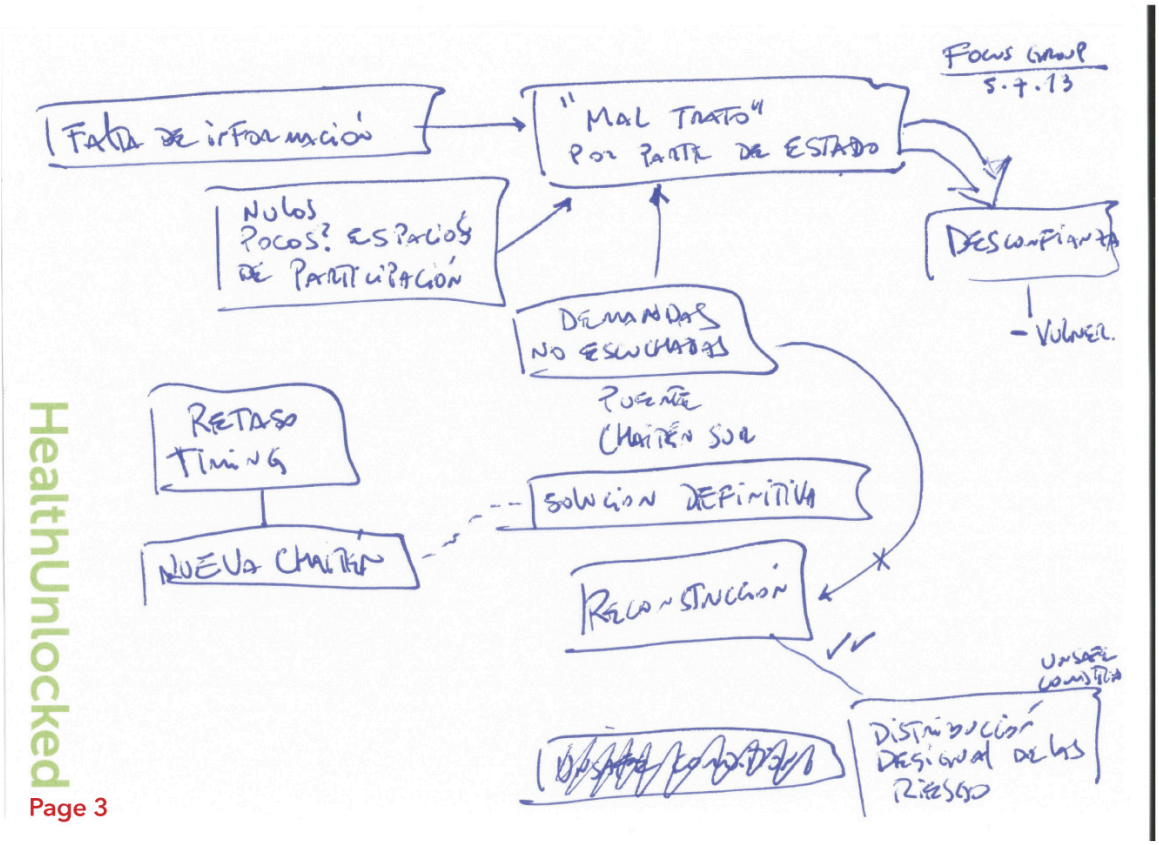
PUENTE } → MOVILIZACIONES } → HAY QUE SALIR DE CH. IR A PUERTO MONTT.
SUR-NORTE.
FESTRAN.

D.O.S.E / BARRERA } → SEGURIDAD PROTECCIÓN
RIO BLANCO / SUR

6) NOS PASAN POR ENCIMA. "DA IGUAL LO QUE QUERAMOS"
→ PN. HABLABA ~~MÁS CON~~ CON MONTAS → ahora con Brattes y DE ALLI BAJA A CHAITÉN → ~~ELLA~~

• → PROBLEMAS DE VIVIENDAS → FALTA. (?)

Page 2



Vicente Sandoval H.
Tel: +44 (0) 7570047039
Email: vicente.sandoval.11@ucl.ac.uk
Length: _____ words approx.

## Interview to [redacted]

SUBDERE, Policy and Studies Division

**Friday 14th June 2013 10:00 at SUBDERE, Santiago, Chile**

**Notes:**

- 1974 Regions are created by Junta Militar in order to better control counter-forces to the regime. In other words, "geo-politics" reasons (Correlate with Egon Montencino sources)
- Policy and Studies Devision (PSD) support to Municipalities Division (MD) and Regional Development Division (ReDD) projects by studies and policy design. PSD participates through other ministries division to prepare studies and propose policies, they called "inter-ministerial committees".
- Municipalities, in general, benefit more than regions from the current political-administrative division of the country. Municipalities are ables to 'produce' incomes through several instruments (patents, bills, etc), however Regions are almost unable to produce any kind of income. That gives a sort of "budget freedom" to Municipalities in relation to Regions. Some Regions may produce incomes thought the item "own funds" (fondos propios). Those incomes may come from Mine Royalties, Casinos, etc.
- Municipalities feed the "national intermunicipal fund" where all municipalities's income is redistributed. That tries to equal rich and poor municipalities. However, each municipality must apply to this Fund by project applications. These applications are made my SERPLAC (Municipal Secretary of Planning) staff only. So, high-income municipalities may have among 20 or 30 SERPLAC officers (often MBAs, highly qualified planners, etc) while low-income municipalities may have 0-3 SERPLAC officers. This creates a huge disparities between projects and municipalities. PSD tries also to help low-income municipalities to apply for development projects.
- Some of the tasks assigned to PSD are:
  - Projects evaluation: FNDR (National Fund for Regional Development), Municipal projects, etc.
  - Support to creation of new municipalities, provinces or regions.





- According to [redacted] there is not a "official cartography" of the internal political division of the country. Sometimes the IGM (Army Institute of Geography) must asks to SUBDERE about the cartographic limits of some municipalities and other SUBDERE must consult to IGM about those limits. There is not accuracy about that so the PSD is now working in a "unified cartography" for the country.
- Verónica Papic Corona, Chief of MD, can give you more information about ONEMI's plans at local level. We do not have any relation with ONEMI at regional planning level.
- SInce 2011 we have been working with Regional Governments (GOREs) in the PROTs (Regional Plan for Territorial Ordering) but there are not results yet (there are not PROT finished yet). The idea of PROTs is to spatialise the Regional Development Strategy (RDS) developed by GOREs every 10 or more years. All regions have developed RDSs, however RDSs have resulted be to much ambiguous for all different actors involved in regional development. So, a way to better visualise and implement that Strategy, it was to spatialise that strategy in PROTs. The problem has been that SUBDERE (promotor of PROTs) does not have all capacities to support all regions in their PROTs preparation. Most of regions have problem with capacities locally installed to prepare and design PROTs. RDS have often been prepared by consulting companies for GOREs, but on PROTs, the idea is that GOREs be able to prepare them by their self.
- There are 5 core-lanes in the development of PROTs

  i) Coastline zone
  ii) Aquifers zone
  iii) Rural zone
  iv) Urban zone
  v) Risks (transversal to other core-lanes)

- You should read Sergio Boisier, who worked at ODEPLAN (Office for National Development: 1974) and who was seminal for most of developmental projects in Chile.
- "The Ministry of Interior never comes to here (SUBDERE). Decentralisation and Regionalisation is not one of his interests". "I guess disaster risk reduction and vulnerability, which may be related to development processes, is not either one of his charge's priorities".

## Appendix 5. Newspaper records

***List of newspaper records consulted for the 1960 Valdivia earthquake***

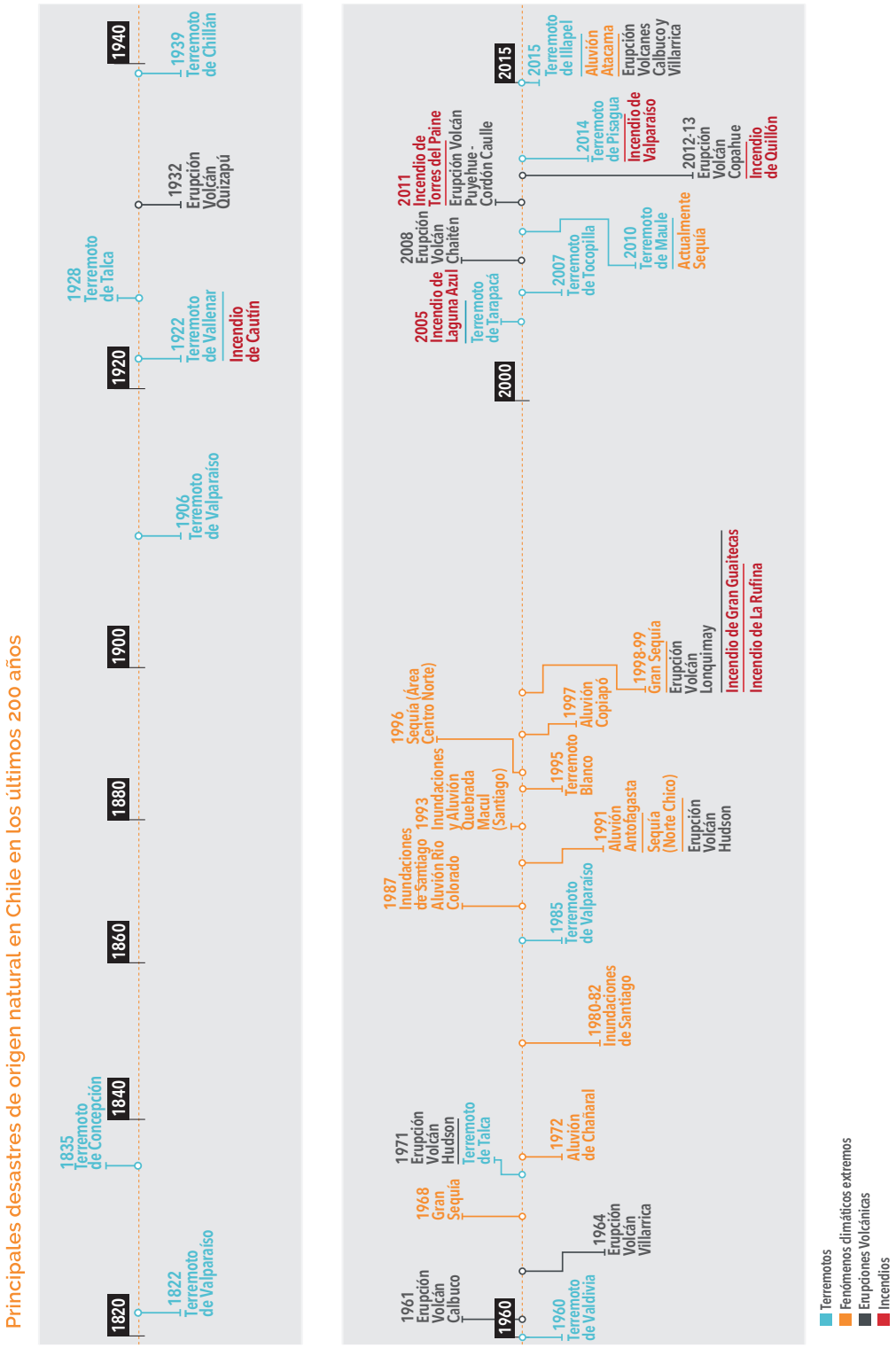
| Newspaper | Date | Retrieved page(s) |
|---|---|---|
| La Nación | 24 May 1960 | 1-6 |
| La Nación | 25 May 1960 | 1, 8, 18-20, 22 |
| La Nación | 26May 1960 | 1-8, 24 |
| La Nación | 27 May 1960 | 1-2, 5, 18 |
| La Nación | 28 May 1960 | 1, 5, 8, 18 |
| La Nación | 29 May 1960 | 1, 5, 10-12, 24 |
| La Nación | 09 June 1960 | 1 |
| La Nación | 08 June 1960 | 1, 5 |
| La Nación | 01 June 1960 | 1-2, 18 |
| La Nación | 04 June 1960 | 8 |
| La Nación | 05 June 1960 | 4 |
| La Nación | 06 June 1960 | 1 |
| La Nación | 07 June 1960 | 1-2 |
| La Nación | 10 June 1960 | 1, 5, 14, 21, 25 |
| La Nación | 13 June 1960 | 1 |
| La Nación | 15 June 1960 | 1 |
| La Nación | 01 July 1960 | 1, 4-5, 14 |
| La Nación | 03 July 1960 | 2 |
| La Nación | 05 July 1960 | 1 |
| La Nación | 06 July 1960 | 1 |
| La Nación | 07 July 1960 | 1, 8 |
| Revista VEA | 02 June 1960 | 1-21, 25-30 |
| Revista VEA | 09 June 1960 | 4-9,18-26, 30 |
| Revista VEA | 16 June 1960 | 1-14, 19, 23-25, 27, 31-32 |
| Revista VEA | 23 June 1960 | 7-13, 20-21 |
| Revista VEA | 30 June 1960 | 8-14, 19, 24-25 |
| El Mercurio | 23 May 1960 | 1 |
| El Mercurio | 24 May 1960 | 1 |
| El Mercurio | 25 May 1960 | 1 |
| El Mercurio | 26 May 1960 | 1 |
| El Mercurio | 27 May 1960 | 1 |
| El Mercurio | 28 May 1960 | 1 |
| El Mercurio | 31 May 1960 | 1 |
| El Mercurio | 01 June 1960 | 1 |
| El Mercurio | 02 June 1960 | 1 |
| El Mercurio | 03 June 1960 | 1 |
| El Mercurio | 04 June 1960 | 1 |
| El Mercurio | 09 June 1960 | 1 |
| El Mercurio | 11 June 1960 | 1 |
| El Mercurio | 14 June 1960 | 1 |

| | | |
|---|---|---|
| El Mercurio | 15 June 1960 | 1 |
| El Siglo | 22 July 1960 | 1 |
| El Siglo | 20 July 1960 | 1 |
| El Siglo | 16 July 1960 | 1 |
| El Siglo | 12 July 1960 | 1 |
| El Siglo | 26 June 1960 | 1 |
| El Siglo | 12 June 1960 | 1 |
| El Siglo | 11 June 1960 | 1 |
| El Siglo | 03 June 1960 | 1 |
| El Siglo | 02 June 1960 | 1 |
| El Siglo | 30 May 1960 | 1 |

## Appendix 6. Relevant disasters in the recent history of Chile

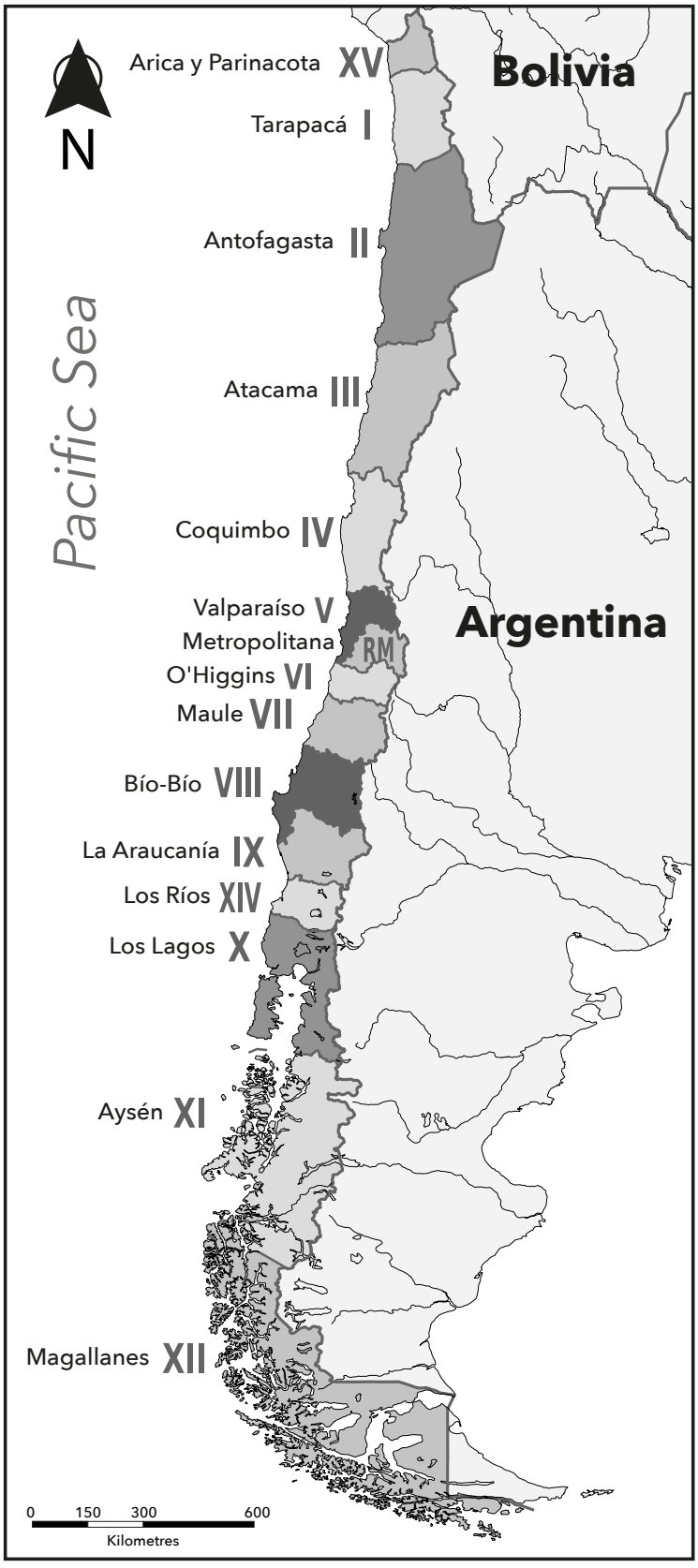
Relevant disasters in the last 200 years of the Chilean history according to the National Commission for Resilience to Disasters of Natural Origin or CREDEN (2016 pp. 36-37).

***Timeline of relevant disasters***



Appendix 7. Regions of Chile

***Political-administrative division of the Chilean territory***



## Appendix 8. Municipal personnel in Chaitén

***Municipal personnel in Chaitén between 2009-2015 by number and type of contract***

| | | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|
| **Municipality** | Permanent contract | 23 | 23 | 22 | 22 | 23 | 23 | 25 |
| | Fixed-term contract | 65 | 6 | 13 | 19 | 25 | 23 | 55 |
| | Service contract | 75 | 36 | 36 | 149 | 132 | 130 | 181 |
| **Municipal services** | Permanent municipal health service | 26 | 26 | 32 | 30 | 35 | 37 | 38 |
| | Permanent municipal education service | 98 | 113 | 104 | 123 | 134 | 160 | 147 |
| | **Total contracts** | **287** | **204** | **207** | **343** | **349** | **373** | **446** |

**Frequency Distribution of Municipal (Chaitén) Annual Income in CLP$ Thousand between 2000-2015**

| Income source/Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Road tax | ** | ** | ** | ** | ** | ** | ** | ** | ** | 23,843 | 18,267 | 24,598 | 28,399 | 34,169 | 36,096 | 42,921 |
| Other national transactions | 386,458 | 418,663 | 405,781 | 148,142 | 264,080 | 225,434 | 508,837 | 483,073 | 656,979 | 394,372 | 411,601 | 1,474,036 | 626,324 | 732,540 | 584,967 | 552,493 |
| *Territorial tax | ** | ** | ** | ** | ** | ** | ** | ** | ** | 5,255 | 3,286 | 3,809 | 1,874 | 1,412 | 14,672 | 14,408 |
| *Municipal tax | ** | ** | ** | ** | ** | ** | ** | ** | ** | 67,154 | 201,596 | 34,623 | 117,245 | 176,960 | 118,821 | 126,097 |
| *Municipal licenses | ** | ** | ** | ** | ** | ** | ** | ** | ** | 101,082 | 104,848 | 85,188 | 85,694 | 102,700 | 124,943 | 131,838 |
| *Other domestic incomes | ** | ** | ** | ** | ** | ** | ** | ** | ** | 24,334 | 54,596 | 68,258 | 54,318 | 28,119 | 606,652 | 383,171 |
| *Previous year remaining balance | ** | ** | ** | ** | ** | ** | ** | ** | ** | 40,000 | 47,000 | 10,000 | 86,216 | 0 | 5,771 | 492,755 |
| Common Municipal Fund (FCM) | 714,948 | 740,712 | 708,507 | 798,680 | 837,326 | 850,208 | 811,562 | 959,705 | 933,941 | 952,672 | 888,605 | 979,365 | 1,060,284 | 1,165,397 | 1,283,490 | 1,450,902 |
| ***Domestic income CLP$ Thousand** | **315,608** | **373,576** | **405,781** | **173,906** | **167,465** | **193,229** | **289,844** | **341,371** | **772,916** | **261,668** | **429,593** | **226,476** | **373,746** | **343,360** | **906,955** | **1,191,190** |
| **Total CLP$ Thousand** | **1,101,406** | **1,159,375** | **1,114,288** | **946,823** | **1,101,406** | **1,075,642** | **1,320,399** | **1,442,777** | **1,590,920** | **1,608,712** | **1,729,799** | **2,679,877** | **2,060,354** | **2,241,297** | **2,775,412** | **3,194,585** |

**Frequency Distribution of Municipal (Chaitén) Annual Income in US$ Million between 2000-2015**

| Income source/Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Domestic income** | **0.49** | **0.58** | **0.63** | **0.27** | **0.26** | **0.30** | **0.45** | **0.53** | **1.20** | **0.41** | **0.67** | **0.35** | **0.58** | **0.53** | **1.41** | **1.85** |
| **Common Municipal Fund (FCM)** | **1.11** | **1.15** | **1.10** | **1.24** | **1.30** | **1.32** | **1.26** | **1.49** | **1.45** | **1.48** | **1.38** | **1.52** | **1.65** | **1.81** | **1.99** | **2.25** |
| **Other national transactions** | **0.60** | **0.65** | **0.63** | **0.23** | **0.41** | **0.35** | **0.79** | **0.75** | **1.02** | **0.61** | **0.64** | **2.29** | **0.97** | **1.14** | **0.91** | **0.86** |
| **Total** | **1.71** | **1.80** | **1.73** | **1.47** | **1.71** | **1.67** | **2.05** | **2.24** | **2.47** | **2.50** | **2.69** | **4.16** | **3.20** | **3.48** | **4.31** | **4.96** |
| *USD-CLP exchange rate at January 2017* | *644.097* | *644.097* | *644.097* | *644.097* | *644.097* | *644.097* | *644.097* | *644.097* | *644.097* | *644.097* | *644.097* | *644.097* | *644.097* | *644.097* | *644.097* | *644.097* |

* Domestic income
** Detailed records for that period are only as 'total domestic income'